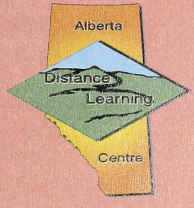
Alberta Distance Learning Centre

Personal Psychology 20

1 Historical Overview of Personality Development

PERSONAL PSYCHOLOGY 20
SSN2171



Personal Psychology 20
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WELCOME!

Welcome to SSN 2171.

We hope you'll enjoy your study of

Personal Psychology 20

Personal Psychology 20 was designed to be a stand alone course of studies to meet student needs. Throughout this course, basic competencies (knowledge, skills, and attitudes) will be identified as follows:

Assignment: Indicates that you are to turn to the appropriate assignment book to complete related activities.

Idea: Presents an interesting idea or thought that is important. It may be followed by an activity or assignment.

Internet: Indicates that additional information is available via the Internet.

Reading: Directs your attention to do additional reading either within the module or additional sources.

Reminder: Serves as reminder to do an important task or activity, or may be used to reference previously read material.

Research: Illustrates that you are required to use additional resources to complete a specific activity or assignment.

Writing: Indicates that you are to do some form of writing outside of the assignment book.

These basic competencies build daily living skills useful in a broad range of future endeavours and careers.

The seven icons that appear here indicate to students and teachers that a basic competency has been identified in the activity offered to the students. Not all of the icons appear in each course.

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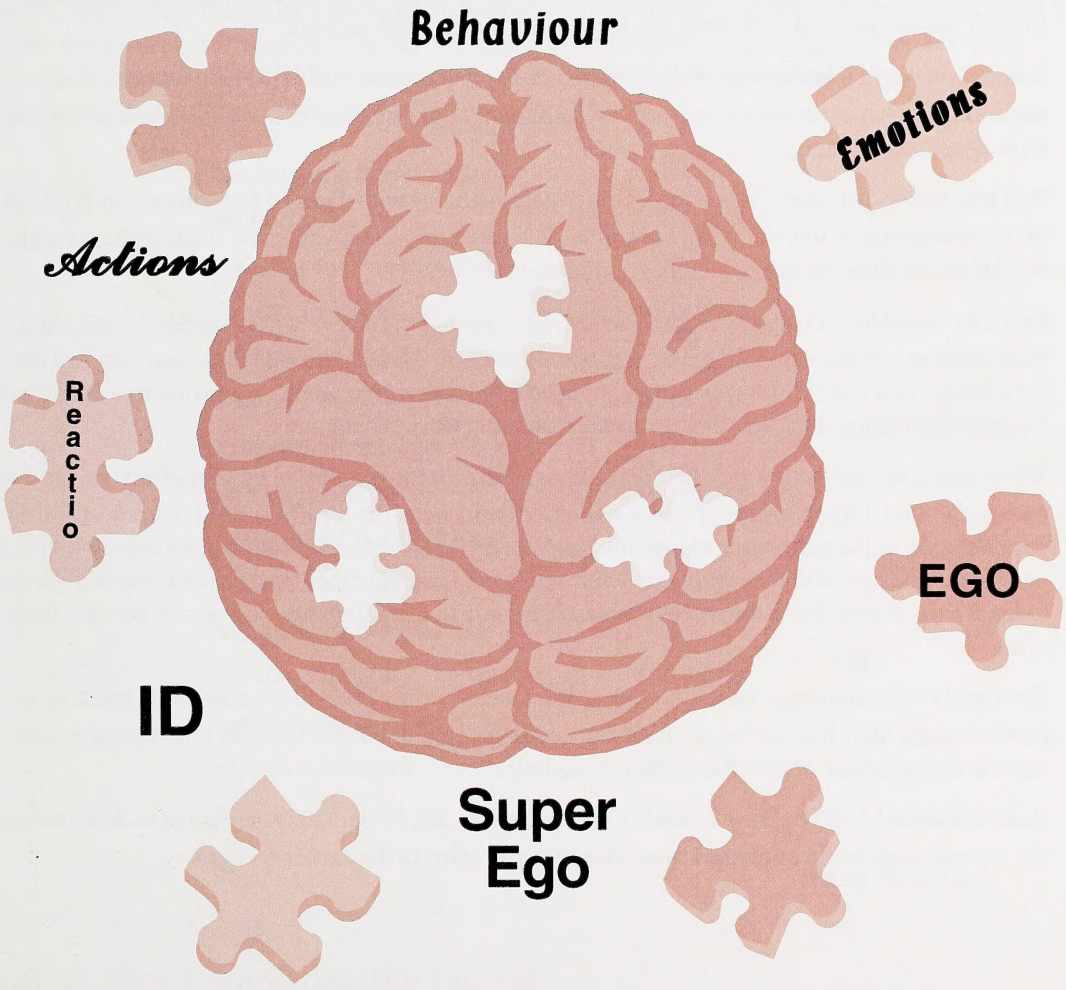
The Human Senses

Introduction

Personal Psychology 20



Welcome to Personal Psychology 20. This course is designed to be an introduction to the field of study called Psychology. The different sections in this course will reflect the diverse study of psychology — from the science of the brain to the more philosophical theories of how we develop our own unique personalities — as well as the different branches of psychology ranging from child psychology to neuroscience. When you have completed this course you will have a basic understanding of what psychology is and you will have gained some insight into your own behaviour and personality.

How to begin your studies

Psychology is such a varied and growing field. Beginning studies may, at first, appear quite daunting. You will be introduced to many new words. Don't panic, new terminology will be explained to you. Psychological terms that you are expected to know will be typed in boldface lettering. For quick reference all boldface terms will also be listed, with their definitions, in the glossary. Following are some more study tips that you may find useful:

- Highlight as you read. You already know that boldface terms will be important when completing your exercises and writing your final exam, so be sure to highlight boldface terms and their definitions. Be selective in what you highlight. It is never necessary to highlight an entire page. Instead, highlight what you think are the main ideas in each section.
- Before you begin a section, read all assignments for that section. This will help to focus your attention on what is necessary to learn. Be sure to highlight sections that will help you when you write your assignments.
- You will not be tested on dates. Don't clutter your memory with dates of experiments or birth dates of psychologists. At this point in your studies it is more important you know the significant terms and be able to decipher the critical themes and ideas in the text.
- Don't be afraid to take study breaks. You are not expected to finish a whole section in one sitting. Each section is broken up into many sections. When you are finished a section, and you feel the need for a break, take one! Clues that you might need a break are your attention starting to wander; your feeling overwhelmed, or your being too tired or hungry to concentrate.
- When trying to learn terms and their definitions, utilizing flashcards can be very effective. On a small cue card (small, cut-up pieces of paper will also work) write the term you need to know. On the opposite side of the card, write the definition. When you are ready to study, quiz yourself by reading one side of the card and then trying to determine what is on the other side. Some terms will be easier to learn than others. Keep the more troublesome cards in a separate pile so you can go over them often.
- Go over every assignment after it is completed. One of the biggest mistakes students make is not proof-reading their finished work. By proof-reading you will be able to catch little mistakes you missed or important points you forgot to include.
- Read the sections and do the exercises in the order they are presented. This course is designed so that the later sections build upon the knowledge that you learn in the earlier sections.

Assessment

The document you are reading is called a Student Module Booklet. It shows you, step-by-step, what to do and how to do it. This course, ***Personal Psychology 20***, is worth three Alberta high school credits and should take you about 75 hours to complete. The course is comprised of four sections. Within each section, your work is grouped into activities such as reading, explanations, and questions.

Your course materials also include 7 Assignment Booklets that you will complete and submit for grading. A portion of your grade (40%) of your final mark is based on these assignments. Assignment Booklet 1 contains assignments related to Section 1 Lesson 1 of the student module booklet. Assignment Booklet 2 contains assignments for Section 1 Lesson 2. Assignment Booklet 3 contains assignments for Section 2 Lesson 1. Assignment Booklet 4 contains assignments for Section 2 Lesson 2. Assignment Booklet 5 contains assignments for Section 3 Lesson 1. Assignment Booklet 6 contains lessons for Section 3 Lesson 2. Assignment Booklet 7 contains assignments for Section 4 Lesson 1. All the Assignment Booklet are of equal value. The mark distribution is as follows:

Assignment Booklet One		
Section 1 Lesson 1	100 marks	
Assignment Booklet Two		
Section 1 Lesson 2	100 marks	
Assignment Booklet Three		
Section 2 Lesson 1	100 marks	
Assignment Booklet Four		
Section 2 Lesson 2	100 marks	
Assignment Booklet Five		
Section 3 Lesson 1	100 marks	
Assignment Booklet Six		
Section 3 Lesson 2	100 marks	
Assignment Booklet Seven		
Section 4 Lesson 1	100 marks	
Assignment Total	700 marks	= 40% of Course Mark
Final Exam		60% of Final Mark

Strategies for Completing the Course

To succeed in this course, be sure to read all of the instructions carefully. Work slowly and systematically through the material. Remember, the work you do in this Student Module Booklet prepares you for assignments. Try to set realistic daily goals for yourself; and when you've set them, stick to them. Do your assignments regularly, and do not forget to review your work before handing it in. Careful work habits greatly increase your chances for success in ***Personal Psychology 20.***

Section One

Introduction and General Development

Lesson 1: Introduction to Psychology

Definition of Psychology

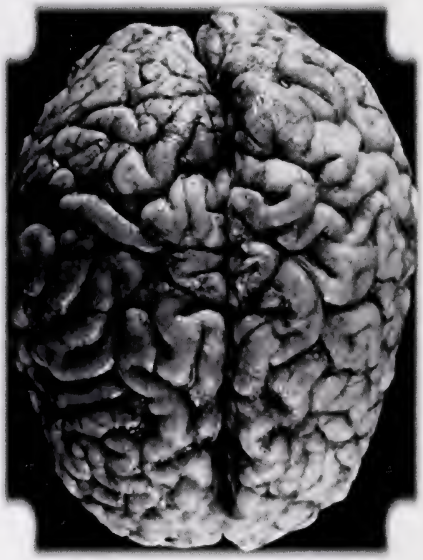
Think of the word psychology. What images come to mind? A person taking notes while another person lies on a couch talking about his/her mother? How about rats running through a maze? Or, maybe, you're thinking about a person who develops character profiles to help the police catch criminals? Well, believe it or not, all of the above examples have something to do with the study of psychology.

The field of psychology cannot be defined by one job description or situation — the field of psychology is very diverse and encompasses many, many things. But what do the above examples have in common? They are all concerned with behaviour. Perhaps the person lying on the couch is in therapy trying to find out why she or he does certain things or acts in a certain manner. The scientist may be interested in why a rat can learn a maze faster when the reward is more desirable. And the profiler may be interested in predicting a criminal's behaviour based on how other criminals have acted in similar situations. So, one thing we know for sure is that the study of psychology is interested in behaviour (animal or human). But what else?

Is psychology a philosophical pursuit or is it a science? Once again, psychology cannot be so easily defined — it is both. As you'll learn in this course, parts of psychology are based on more philosophical theories, such as the numerous personality theories. But how good is any theory without some form of collaborating evidence? It is fine to say that all humans like to eat blueberries but the claim has little value unless it is supported by valid research. Philosophical theories on behaviour will better stand the test of time if they can be supported with data. This support is actually the basis of the **scientific method** (which will be discussed later in this lesson) — coming up with a theory and then supporting it with evidence.

scientific method – a set of attitudes and procedures for gathering and interpreting scientific data

Psychology can also be considered a science in a more conventional manner. Some branches of psychology are primarily concerned with how the brain works and how it affects behaviour as well as how we see, hear, smell and touch. Other branches of psychology are very interested in how our genetic makeup affects our behaviour. We know, therefore, that psychology is both a philosophical and scientific pursuit. We are now ready to define **psychology** as the scientific and philosophical study of an organism's behaviour. Keep in mind that this study includes every mental and physical process that affects behaviour as well.



Now that we know the definition of psychology, let's reinforce our understanding by examining the major misconception about psychology — that it is simply common sense. You may assert that the reason you pull your hand away from a hot stove is that you don't want to be burned; but, how did you learn this? Was it a knowledge you were born with? Why does your skin respond to heat and how does it relay this message to your brain? How did your brain make the connection between a hot stove and a burned hand.

Professionals in the Field of Psychology

What kinds of jobs are available in the field of psychology? Besides teaching or researching, many of the jobs in the field deal with helping people. These jobs are called the helping professions and they vary in the amount of training required as well as in the type of help they can legally offer. Following are some helping professionals.

Clinical Psychologists

clinical psychologists – psychologists who work with clients in an attempt to help the clients deal with their problems

Clinical psychologists treat people with various types of behaviour problems. The problems can range from addictions to learning disabilities to depression to phobias — the list goes on and on. The duties of clinical psychologists include psychotherapy (talking with clients about their problems and working together to solve them), using various testing techniques to identify a person's problem, and teaching, researching and consulting on **clients** (people who visit a clinical psychologist are not usually called patients; they are called clients).

A clinical psychologist usually has a bachelor degree as well as a post-graduate degree. Depending on their job descriptions and the province in which they work. Some psychologists, with only a master's degree, can work with clients. Other psychologists need a doctorate (a doctorate is not a medical degree, although it requires more training than a master's degree) to be able to work with clients, in all provinces.

Psychiatrists

psychiatrists – medical doctors who treat clients with abnormal behaviours

Psychiatrists perform all the same duties as clinical psychologists but they are medical doctors. Because they have medical degrees they are licensed to prescribe medication and to treat physical ailments.

Counsellors

Counsellors perform activities such as preventative treatment, consultation, development of outreach programs, vocational (job and career) counselling and short-term therapy lasting between one and fifteen sessions. Counsellors most often work in educational settings but may also be employed in hospitals, clinics or in private practice. Their main focus is the client in social situations, so they often hold family or group therapy sessions. They also use certain tests to assess clients' needs or aptitudes. Counsellors generally have a bachelor's degree as well as a post-graduate degree in counselling.

Psychological Paraprofessionals

Psychological paraprofessionals work in close contact with clinical psychologists and psychiatrists. They can be psychiatric nurses, hospital attendants, therapists or volunteers. Their education varies but they are very important in the helping profession because of their close contact with clients. They may be able to offer valuable insight into a client's behaviour.

The Different Branches of Psychology

Psychology has many different branches. Each branch focuses on different aspects of behaviour. One branch may focus purely on how people behave in social settings; another may be more focused on the behaviour of children. In this section you are going to learn about some of the major branches of psychology. It is important to know that these branches are very broad and within each branch are many smaller subdivisions. Also, many of the different branches borrow research techniques and philosophies from the others. Although you will learn more about the various branches of psychology in subsequent chapters, the following descriptions are meant to provide you with some introductory knowledge.

Abnormal Psychology

abnormal behaviour – abnormal behaviour is based on three things: if the individual experiencing the behaviour is distressed by it; whether or not the behaviour affects the individual's life or functioning in a negative way; and whether or not the behaviour is deemed culturally acceptable

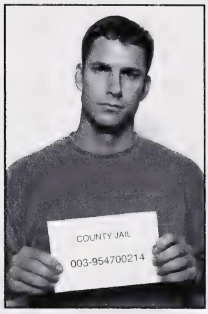
Abnormal psychology studies the causes and treatments of abnormal behaviour. But what is abnormal behaviour? Who gets to decide what should be considered abnormal and normal? Say you like to brush your teeth after you eat lunch. Very few people actually brush their teeth at lunch time even though it is better for their dental health. So, is brushing your teeth after lunch considered an abnormal behaviour because the majority of people don't brush their teeth after lunch? Absolutely not. A behaviour is not considered abnormal based on what the majority of people do or don't do. Whether or not a behaviour is considered abnormal generally depends on three things (Holmes, 1994):

1. Whether or not the individual is distressed by the behaviour. For example, if a man is so depressed that he can't even eat, cloth or bathe himself, then we can assume the man is not living his ideal life. The man's debilitating depression can be considered an abnormal behaviour.

2. Whether or not the behaviour affects the individual's life or functioning in a negative way. For example, if a woman has a phobia of other people, then it is reasonable for us to assume that her phobia negatively affects her life. If the woman is afraid of people how could she ever have healthy relationships with others? She wouldn't even be able to do simple things like shop for groceries, or work with other people. The woman's phobia can definitely be considered an abnormal behaviour.

phobia – an intense fear

3. Whether or not the behaviour is deemed culturally acceptable. For example, in Canadian culture physically hurting someone is not only considered unacceptable, it is against the law. So a person who runs around hitting strangers is exhibiting an abnormal behaviour based on the standards of the Canadian culture.



If a behaviour falls into any of the above three categories, it is considered abnormal and it is the job of the branch of abnormal psychology to research its causes, effects and possible treatments.

Behavioural Psychology

Behavioural psychology is based on the notion that behaviours are learned. Behaviourists are also often called learning theorists. Learning theorists are not philosophical in their approach to psychology. They believe that conclusions about behaviour can only be made if they have been observed directly. Behavioural psychology focuses heavily on research.

Clinical Psychology

Clinical psychology deals exclusively with treating people with abnormal behaviours. Clinical psychologists as well as counsellors and psychiatrists rely on techniques from other branches of psychology in order to help their clients. The helping professionals work under the branch of clinical psychology.

Hypnosis

hypnosis – an alternate state of awareness inducted by a trained hypnotist

Hypnosis is not just a technique entertainers use in comedy routines, it is a technique used by some clinical psychologist and psychiatrists to treat abnormal behaviours in their clients. It can be defined as an artificially induced state of awareness which resembles sleep. The hypnotized person is very open to suggestion and, although he or she may believe almost anything he or she is told and will do almost anything that is requested of them, there are limits to what they will actually do.

There are many ways to produce a hypnotic state but all techniques used involve narrowing the subject's attention span so that he or she is aware of only what the hypnotist is saying to him or her. The use of hypnosis, therefore, does not always yield results because not everyone has such focused concentration. Many average people can be hypnotized if willing, but a co-operative spirit and enough time must be present as well. With this in mind, many average adults and most children, mentally handicapped, and mentally ill people cannot be hypnotized.

Hypnotherapy is the treatment of emotional and mental problems with hypnosis. A post-hypnotic suggestion may make it possible to suggest to a hypnotized person that he or she is to perform a particular act after he or she has awakened. Because of this and related concerns, many people are hesitant to undergo hypnosis and with good reason – it can be an abused technique because it is fairly easy to learn with little training. Also, the unqualified use of hypnosis can disguise serious problems and delay their proper treatment.

Hypnosis can be used effectively in a variety of ways including using hypnosis to reduce stress by inducing deep relaxation or as a replacement to chemical anaesthetic during surgery. Hypnotic suggestion can also be used to reduce cronic pain and post-hypnotic suggestions can help to control smoking or compulsive eating. These are but a few uses of hypnosis.

Cognitive Psychology

Cognitive psychology focuses on what is called human information processing. Human information processing is the manner in which the brain does things like learn, memorize, problem solve, recognize, use language and many other higher order processes. Cognitive psychology relies heavily on both philosophical and scientific thought. Cognitive scientists attempt to prove, scientifically, theories generated philosophically. Scientifically proving a cognitive theory is very difficult because it is illegal and unethical to perform certain types of research on humans. Cognitive psychologists rely heavily on computer models to attempt to prove their theories. The use of computer models is relatively new in the history of psychology and, as of yet, no computer has ever come close to matching the intricacies of the human mind.

Developmental/Child Psychology

Developmental or child psychology (the terms are interchangeable) studies the way a child's behaviour changes as the child develops or grows into adulthood.

Developmental psychology focuses on physical growth, mental growth, moral growth and all other aspects of human nature.

Parapsychology

Parapsychology is not a fully accepted branch of psychology. Although some universities have departments of parapsychology, they are exceptions to the rule. Parapsychology studies mysterious phenomenon like psychic powers, telepathy, ghosts, out-of-body experiences and reincarnation. Perhaps the reason parapsychology has failed to gain much respect in the field of psychology is that the occurrence of mysterious phenomena is very hard to prove or document. History is full of examples of charlatans duping people into believing they have special powers when they do not.

An example of a parapsychological hoax is the notion of psychic surgery. Originating in the Philippines, psychic surgery is supposed to be a way of removing cancerous tumors from a body without piercing the body in any way. Although it is still practiced as a form of faith healing all over the world, the tricks of the trade are generally known. Disreputable individuals claiming to be "psychic surgeons" charge the unsuspecting victim a substantial fee for psychic surgery. A great show is made as the surgeon goes into a trance over the ailing person's body. After massaging the area where the tumor is located, the "surgeon" appears to have miraculously removed the tumor and holds up a

bloody mass of tissue without ever cutting into the "patient." In reality, these psychic surgeons use sleight of hand tricks (much as a magician would use) to palm bloody animal parts out of a hidden place and pass them off as tumors. The effect is that the patient believes she/he is cured without having to go through actual surgery. This practice is very dangerous for people with serious illnesses who believe they are cured and neglect to seek any real medical attention.

It is easy to see why the study of parapsychology is so easily disregarded when frauds and hoaxes are revealed. Consider the trend of phone psychics. It's a multimillion-dollar industry in which people pay upwards of $5 a minute to hear what the future holds for them. How many people on the other end of the line actually have psychic abilities and how many are just earning their living any way they can?

Is the entire parapsychology branch bunk? Answer that question for yourself. Do you ever experience *deja vu* (a feeling that you have already lived that exact same moment)? Do you believe in ghosts or angels? Do you believe in reincarnation? Do you ever get premonitions (forewarnings of things to come)? If you answered yes to any of these questions, and many people do, then we have a need for investigation into the paranormal.

Physiological Psychology

hormones – chemical substances released by glands that can affect body development and behaviour

Physiological psychology is concerned with how the body affects behaviour. This includes how brain structures, hormones, cells, the nervous system, drugs and injuries affect how we think, act and move. Physiological psychologists believe that the mind and the body are one. They believe that our thinking or the way we perceive the world can all be explained by the physical workings of our bodies.

Social Psychology

Social psychology is the study of how humans behave in social situations. It focuses on how an individual's behaviour is influenced by others. Some research topics include relationships, aggression, stereotypes, attraction, behaviour in groups and prejudice.

Using the Scientific Method to Study Psychology

As you learned earlier in this chapter, psychological theories without scientific research to back them up are of limited use. In order to test their theories, psychologists use the **scientific method**. The scientific method can be described as follows: "A set of attitudes and procedures for gathering and interpreting objective information in a way that minimizes sources of error and yields dependable generalizations." (Zimbardo, 1988.)

Basically the scientific method provides a basic set of instructions for scientists to follow when they are conducting an experiment. Scientists acknowledge these instructions as correct and appropriate procedures for experimentation. Following are some of the components of the scientific method.

Developing a Hypothesis

hypothesis – a prediction made by a scientist about to conduct an experiment. It clearly states what the scientist believes will be the outcome of his/her experiment

Before a scientist begins an experiment s/he must have a hypothesis. A hypothesis clearly states what the scientist believes will be the outcome of his/her experiment — it is a prediction. For example, Dr. Doglover believes that cats will learn not to eat a food that has previously made them sick (this type of experiment would be called a taste aversion experiment. Many similar experiments have been performed on many different animals). Dr. Doglover's hypothesis will be: cats will not eat food that has previously made them sick.

Independent Variables, Dependent Variables and Controls

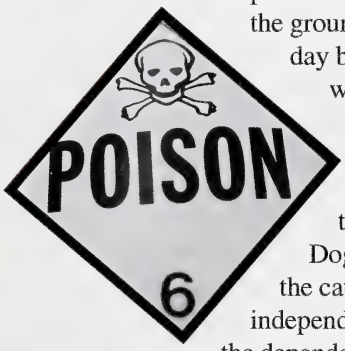
Now that Dr. Doglover has her hypothesis, she must now design an experiment that will support it. She believes she will test her hypothesis on two groups of cats over three days. On day one, she will give both groups plain ground beef to eat. On day two, she will give group A plain ground beef to eat but she will give group B ground beef that has been sprinkled with a mild poison (causing the cats to feel ill for about an hour). On day three she will offer both groups plain ground beef. If her hypothesis is correct, group B will not eat the ground beef on day three.

independent variable – the variable in the experiment that when introduced is supposed to cause a change in the behaviour of the test subjects

dependent variable – the change in behaviour that arises in an experiment because of the independent variable

control group – identical to a test group but no independent variable is given

Dr. Doglover has designed her experiment using the scientific method. She has an independent variable, a dependent variable and a control. An **independent variable** is the part of the experiment that, when introduced, is supposed to cause a change in the behaviour of the test subjects. In Dr. Doglover's experiment the independent variable is the poison in the ground beef. She believes that the cats will not eat the ground beef on the third day because it made them sick the day before. But the group who did not receive the poison will continue to eat the ground beef because they did not get sick after eating.



A **dependent variable** is the change in behaviour that arises because of the independent variable. In Dr. Doglover's experiment, the dependent variable would be the cats refusing to eat the ground beef on the third day. The independent variable (change in the experiment, poison) causes the dependent variable (change in behaviour, refusal to eat).

But how do we know that the poison (independent variable) actually makes the cats refuse to eat the food (dependent variable) on the third day? Maybe those cats are just tired of eating ground beef or maybe they're not hungry? This is why every experiment needs a control group. A **control group** is identical to the test group but no independent variable is given to them. In Dr. Doglover's experiment group A is the control group because they are never given the poison (independent variable). Therefore, if group B refuses to eat the ground beef on the third day, but group A does eat it, we can assume that the difference between the two groups has been caused by the independent variable (poison).

For control groups to be effective they must resemble the test group as closely as possible. If the test group is all male then the control group must be all male. If the test group is full of three-legged cats then the control group must be full of three-legged cats. It is important to minimize any difference between the two groups. If the test group was full of three-legged cats and the control group was full of four-legged cats, a critic may say that the independent variable (poison) didn't cause the dependent variable (refusal to eat) but it was the fact that the test group had three legs instead of four. This seems silly but an experiment is only considered valuable if all other extraneous factors are minimized. Extraneous factors are other things that could have caused the dependent variable (refusal to eat food) other than the independent variable (poison).

Overt and Covert Behaviours

overt behaviour – a behaviour that can be observed in the form of a physical response

covert behaviours – behaviours that are undetectable by the human observer

Dr. Doglover is interested in observing an overt behaviour if her hypothesis is correct. An **overt behaviour** is a behaviour that can be observed in the form of a physical response. The overt behaviour the doctor is hoping to see is the cat's refusal to eat the ground beef on the third day. As you know, all animal and human behaviours are not overt. Mental processes such as thinking, reasoning and problem solving cannot be considered overt because they do not produce a physical behaviour. A person can solve math equations in his/her head without moving a muscle. Mental behaviours are called **covert behaviours** because they are undetectable by the human observer.

It is easier to perform experiments that rely on overt behaviours to support their hypotheses because overt behaviours are readily observable. It is very difficult to design an experiment that studies covert behaviours. As you have previously learned in this chapter, cognitive scientists study covert behaviours and they face many roadblocks in scientifically supporting their theories.

Lab Research and Field Research

Now that Dr. Doglover has designed her experiment, she must decide where it will take place. She has two options available to her. She can work in a laboratory setting, or in the field. The laboratory certainly offers the doctor more control. She can make sure that all the test subjects are similar. She can make sure that the cats eat only what she gives them. She can make sure the test group and the control group are kept separated. In a laboratory setting Dr. Doglover can rule out many extraneous factors.

The scenario would be much different in a field setting. Field research is conducted in the test subjects' natural environment. In Dr. Doglover's experiment, she would have to find a place where many cats live all together. If she were using prairie dogs, she could go to a field where many live and observe them; but other problems could arise. It would be hard to separate the test subjects into groups without upsetting their natural environment. It would be hard to identify the different groups and it would be hard to keep track of their behaviour when they were burrowing in their holes.

Field research involves many extraneous factors. So, why do scientists even bother to do field research? Many scientists believe that the unnatural setting of the laboratory may cause behaviours that are not seen in a natural setting. In many cases this is true. A cat that has grown up in the wild will be very different from a cat that has been raised in a laboratory. Scientists in favour of field research argue that test results from laboratory settings are unnatural and it is unreasonable to believe that what applies in the laboratory will apply in a natural setting. Think of it this way; if you were sitting in a bare room being watched by strangers would you act differently than you would while alone in your own home? The idea of field research is a good one but, depending on the type of experiment, it is very hard to do correctly.

Dr. Doglover will have to choose a laboratory experiment if she wishes to minimize extraneous factors that may affect her results.

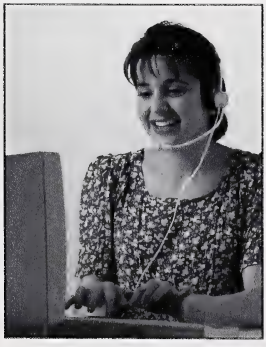
Empirical Evidence and Data

empirical evidence – the data (reports from observations) that is carefully obtained during an experiment

In order to validate her hypothesis, Dr. Doglover must come up with some **empirical evidence**. The evidence she wants to obtain is observations of cats avoiding a food that has previously made them sick.

Using Statistics to Support a Hypothesis

After Dr. Doglover collects data, she must analyze it to see if it supports the hypothesis. If 75% of the cats refuse to eat the ground beef, does the data support the hypothesis? That all depends on the statistical tests used, the number of test subjects and to what degree of accuracy the doctor wants to support her theory. Statistics are a device used by scientists to mathematically support the notion that their results were caused by the independent variable rather than just a chance occurrence. In this course you will not be required to perform statistical operations nor to analyze statistical results but it is important for you to know of the many possible statistical tests. Depending on the standards of the researcher, some tests will support a researcher's hypothesis while other tests, with stricter standards, may not. It is unwise to believe a claim of results "statistically shown" unless you know what type of tests and test standards were used.



Research and Ethical Concerns

Whether using animal or human test subjects, scientists face many ethical consideration. Is it morally right to experiment on living organisms? Consider Dr. Doglover's experiment. She is keeping two groups of cats in her laboratory (usually in small cages) and she will be giving poison to half of them? Does Dr. Doglover's experiment constitute animal cruelty or does the scientific merit of the experiment outweigh the pain she will cause the cats?

Research performed in university or colleges has to meet certain standards concerning test animals, holding cages and scientific merit. In Canada, the body that sets the standards for animal research is the Canadian Council on Animal Care (CCAC, established in 1968). Yet the CCAC's power is quite limited. It is able to monitor only institutions that volunteer to be monitored. Also, if the CCAC judges one of its volunteering institutions to be treating animals poorly, it cannot press charges or stop the experimentation. The CCAC gains its power by maintaining close contact with the government and with various granting agencies. If the CCAC finds a violation in its guidelines, it contacts the granting agencies who then withdraw any funding they are providing for that experiment. If one researcher at a particular university gets his/her funding withdrawn, it is very likely other researchers at that university will have a very hard time getting funding for their animal experiments. So, in this regard, it is very wise for any institution wishing government funding to become monitored by the CCAC — and adhere to its standards.

But what about private corporations that don't rely on government funding (e.g. some pharmaceutical companies, cosmetic companies, food companies)? Because these companies can afford their own research, they have no reason to fear the CCAC. This is where consumers must be aware of the kind of animal testing used by the companies whose products they buy. Most large companies in Canada voluntarily follow the CCAC guidelines so as not to lose customers. Lots of other companies have disbanded animal testing all together and clearly boast on their packaging "not tested on animals". The cosmetic industry is a forerunner in disbanding animal testing.

The ethical guidelines set out by the CCAC are well defined but many protesters believe they do not go far enough. Based on their own moral beliefs many scientists refuse to do animal experimentation. Many of these scientists choose to do field research in which they simply observe and never interfere. Others, like the cognitive scientists, are trying to develop computer models for research.

vivisection – dissection or other painful treatment of living animals for purposes of scientific research

What about human subjects? True, no scientist today would start cutting open a living human being just to see how she/he works — although this kind of experimentation (vivisection) was performed as recently as the twentieth century under the Nazi regime — scientists still have to be very careful when trying to manipulate human behaviour. It is considered unethical to cause human test subjects undue stress and anxiety. All human test subjects must also be given the right to leave an experiment any time they start to feel uncomfortable. Upon request, at the end of the testing, subjects must also be informed of the true nature of the test. Any researchers treating human test subjects in an unethical manner face getting arrested, sued, fired or blackballed from the scientific community.

Turn to Assignment Booklet 1 and complete the assignments for Section 1, Lesson 1.

Lesson 2: Physical and Psychological Development

Foundations of Developmental Psychology

As we learned in lesson one, developmental or child psychology studies the way a child's behaviour changes as the child develops or grows into adulthood. Developmental psychology has two major goals:

1. To describe the behaviour of children at each stage of their development. Examples of this would be determining the age that babies first start to talk; examining how a child of four determines what is considered right and wrong; and how a fetus develops in the womb.

2. To identify the causes and processes that produce changes in behaviour from one stage to the next. Examples of this would be studying the effects that the environment has on a child's ability to learn or studying the effects that genetics has on childhood intelligence.

Vasta, Haith and Miller, 1992

Psychologists generally divide the life span of human beings into nine different stages (Zimbardo, 1988): the prenatal stage; infancy; early childhood; late childhood; adolescence; young adulthood; middle age; old age and death. (Please see the chart below for definitions of each stage.) In this lesson you will be focusing on the first five life stages (prenatal through adolescence). Human beings go through their most extensive changes during these stages. Although emotional and mental development continues through adulthood, the changes that occur are more subtle.

Stages in Life

Stage 1 Prenatal Stage	Age Range Conception to birth	Some Typical Characteristics Physical development
Stage 2 Infancy	Birth at full term at about 18 months	Locomotion, rudimentary language; social attachment
Stage 3 Early Childhood	About 18 months to about 6 years	Language well established; gender typing; group play' ends with "readiness" for schooling
Stage 4 Late Childhood	About 6 to about 13 years	Many cognitive processes become adult except in speed of operation; team play
Stage 5 Adolescence	About 13 to 20 years	Highest level of cognitive capacity reached; independence form parents; sexual relation ships
Stage 6 Young Adulthood	About 20 to about 45 years	Career and family development
Stage 7 Middle Age	About 45 to about 65 years of age	Career reaches highest level; self-assessment; retirement
Stage 8 Old Age	About 65 years to death	Enjoy family, achievements; dependency; widowhood; poor health
Stage 9 Death		A "stage" in a special sense

In fact, development during childhood is important because at certain **critical periods** of time, certain skills must be acquired or they will never appear. This phenomenon occurs in animals as well as humans. Young cats that are forced to wear eyeshades with vertical lines on them during a critical period will never be able to see horizontal lines (Hirsch and Spinelli, 1970). This occurs because certain cells in the cats' eyes translate vertical and horizontal lines separately. The cells that translate the horizontal lines never develop because they've never been exposed to horizontal lines. In this manner, the cats would be able to see the legs of a table but not the table top.

In some extremely severe cases of child abuse, children who were isolated and confined in small spaces during certain critical periods were never able to fully develop motor skills like walking or language skills like talking in complete sentences — thankfully, very few of these cases exist. One such case, of a young boy who lived in the wild and never developed social skills during his critical periods, will be discussed in a later lesson dealing with heredity and the environment.

This lesson will focus on the different aspects of developmental psychology, landmarks in childhood development and basic designs used in developmental psychology research.

How Developmental Psychology is Studied

Three Types of Developmental Research

descriptive research – involves simply monitoring behaviour and recording observations

correlational research – discovers relationships that exist between two variables

Developmental psychology involves three major types of research — descriptive research, correlational research and experimental research. **Descriptive research** involves simply monitoring a child's development and recording observations. No attempt is made by the researcher to manipulate or interfere with the child's development in any way. No inferences are ever made as to what might cause the observed behaviours.

Correlational research involves discovering relationships that exist during development. Correlational research goes beyond descriptive research because it does try to identify certain things that affect behaviour. For example, Dr. Watcher is a scientist doing descriptive research and he discovers that every night Baby Billy wakes up crying. Dr. Watcher records this observation in his notes. Now, a different scientist, Dr. Doer, is doing correlational research and wants to know why Baby Billy wakes up every night crying. Dr. Doer believes that Baby Billy's nocturnal wailing is related (or correlated) to the fact that he needs his diaper changed. To test his theory, Dr. Doer checks Baby Billy's diapers when the infant wakes up crying. If Baby Billy's diapers are wet every time he wakes up crying, then Dr. Doer has probably found a correlation between Baby Billy's crying and his wet diaper.

The third type of research used by developmental psychologists is scientific research — which you've already learned about in lesson one. As you recall, scientific research involves developing a hypothesis, designing an experiment and analyzing the results. Scientific research (based on the scientific method) is considered more involved than either descriptive or correlational research. For example, if Dr. Doer wants scientifically to test if Baby Billy's night time crying is correlated to his wet diapers, then he might design an experiment with many babies. Dr. Doer might develop a machine that squirts water into the babies diapers when the babies fall asleep. He then could record whether or not the babies wake up once their diapers have been mechanically made wet.

Different Study Designs

Following are some of the study designs that psychologists use to investigate developmental changes and differences. The study design a psychologist chooses will also affect the type of research method (described above) that can be implemented.

Normative Studies

normative studies – designed to determine averages or norms

Normative studies use descriptive research to compile developmental timetables. These developmental timetables list the ages at which "normal" children develop certain behaviours like walking and talking. Terms like "normal" or "norm" are used in developmental psychology not to judge a child as being either normal or abnormal but, rather, to represent an average. For example, say you want to determine the average age at which a child can throw a ball five meters. You have the permission of five children (and their guardians!) to determine the average age. You wait patiently for many years, then all of a sudden Angela throws the ball five meters at the age of 3.5 years. You wait a little while longer and Brad throws the ball five meters at the age of 3.8 years. Slowly the rest of your test results trickle in: Cam at 4.1 years, Debbie at 5 years and Elvis at 5.5 years). Now you have enough data to determine the average age at which a child can throw a ball five meters $(3.5 + 3.8 + 4.1 + 5.0 + 5.5)/5 = 4.38$ years.

Based on your results the average age at which a child can throw a ball five meters is 4.38 years, or, the "normative/ norm/normal" age for throwing a ball five meters is 4.38 years. So, in other words, the term normal is not a judgment but simply another word for average.

Historical Studies

historical studies – used to study the differences between different generations

Historical studies are used to study the differences in development between different generations. In order to attempt an historical study, a large amount of previously collected data must be available. In other words, you must rely on the research of others to bring credibility to your own research. Say you wanted to determine if the average age of puberty has differed in the last 100 years. If statistics were available, you could compare modern day data on the subject to data collected 25, 50 and 100 years ago.

The major problem with historical studies is finding relevant data with which to make a comparison. You may want to study puberty across the ages but did anyone else want to? We may have no data to collect on the subject. One area in which historical studies have become quite prominent is in researching family histories of illness. Medical doctors are very interested in knowing whether or not genetics play a role in diseases like cancer, multiple sclerosis and diabetes.

Longitudinal Studies

longitudinal studies – used to study the same people at different ages

Longitudinal studies are used to study the same children at different ages. (The definition is easy to remember because *long*itudinal studies take a *long* time). Longitudinal studies are very good for researching the change in behaviour as children age. For example, if you thought that students' grades remained the same throughout their school years, you could test this theory with a longitudinal study. At the end of each school year (from grade 1 to grade 12) you could record the grades your test subjects got on their report cards. After 12 years of collecting data you could then compare each child's grades throughout the years. If the grades remained relatively the same then you would have collected evidence to support your theory.

The major problems with longitudinal studies are the time involved and the loss of test subjects. In the above example the testing period lasts twelve years! This is a substantial portion of anyone's life! And years' worth of data could be lost when a test subject moves and neglects to tell the researcher. Some other problems may arise such as death or injury. A longitudinal study requires a great commitment on behalf of the researcher and the test subject.

Cross-sectional Studies

cross-sectional studies – used to test subjects from different age groups simultaneously

Cross-sectional studies focus on testing subjects from different age groups simultaneously. If you wanted to study the ability to memorize a list at different ages, you could test 100 children from each age group (age 5, 6, 7, etc.) and compare the results. Unlike longitudinal studies, you would not have to wait to test your subjects when they grow older; instead you could test many different age groups in the same week — or even the same day!

cohort effect – a comparison of different generations when they are the same age. For example, a comparison of the average height of six year olds today compared to the average height of six year olds 50 years ago

One major drawback of cross-sectional studies is known as the **cohort effect**. For example, how will children who are now six years old be different from you when they reach your age? Most six-year-olds today have much more exposure to computers, video games and violence on television than you ever did. So when they reach your age they might be more technologically advanced, have shorter attention spans and act more aggressively. So, if you were studying the ability of six year olds to memorize a list, the six-year olds may do worse on the test than someone your age — not because of how old they are but because video games have greatly decreased their attention spans. When using a cross-sectional design, it is wise to be aware of any other extraneous factors (such as the cohort effect) that may affect your test results.

Sequential Studies

sequential design – combines the best features of a longitudinal study and a cross-sectional study

A **sequential design** combines the best features of a longitudinal study and a cross-sectional study. If you wanted to study the change in problem-solving ability between different age groups you could study a group of seven-year-olds, a group of eight-year-olds and a group of nine-year-olds. You could study all three groups for three years. In this manner, you would be studying a broad age range and you would also be able to detect any cohort effects because the age groups would overlap.

Twin Studies

twin studies – used to determine the effects the environment has on behaviour. Identical twins who were separated at birth (usually through adoption) are later tested for behavioural differences.

Twin studies are excellent for determining what effects the environment has on behaviour. Identical twins who were separated at birth (usually through adoption) are later tested for behavioural differences. (As you can imagine, twin studies are few and far between. A researcher is very lucky to find twins who have never met each other, live in drastically different environments and are willing to be tested.) Because the twins are genetically identical, differences are assumed to be related to differences in their environments.

Twin studies are also excellent for studying the genetic factors that influence abnormal behaviours. If one twin is extremely aggressive but the other is not, then researchers may theorize that aggressive behaviour is more likely correlated to environmental factors rather than to genetic factors.

Physical Development

As you learned earlier in this lesson, psychologists have divided the human life span into nine stages — the first stage being the prenatal stage. The prenatal stage represents the development of the fetus in the womb and it is the most important stage as far as physical development is concerned. Many critical periods exist during the prenatal stage. If anything out of the ordinary occurs during a critical period, the fetus may be at risk for not fully developing eyes, limbs, ears or even the brain and heart. The chart below depicts the critical stages for physical development during the prenatal stage.

Critical stages of fetal physical development during the prenatal stage.
From K.L. Moore, Child Psychology: The Modern Science, (Philadelphia: W.B. Saunders Co., ©1992), p. 129 fig 5-7. Used by permission.

As you can see from the chart, the prenatal stage is riddled with different critical periods. Because physical development is so important during these stages, expectant mothers must be very careful about any exposure to chemicals and drugs.

teratogens – anything that may harm a fetus when exposed to the mother

Teratogens include legal and illegal drugs, the mother's health and age, and harmful chemicals in the environment. Perhaps the most notorious case of a teratogen affecting fetal physical development occurred during the late 1950s and early 1960s and was caused by a drug called Thalidomide. Thalidomide was a legal drug prescribed as a remedy for morning sickness or as a mild sedative. Expectant mothers who took Thalidomide during their pregnancies gave birth to babies with seriously deformed limbs and defective organs — that is, if they gave birth to living babies. Although Thalidomide was taken off the market in Canada years ago, many other teratogens still exist. Following is a list of some of the known teratogens and their effect on a fetus.

Teratogen	Potential Effects
Therapeutic Drugs	
Aspirin	In large quantities, abortion, bleeding, newborn respiratory problems
Barbiturates	Newborn respiratory problems
Diethylstilbestrol DES) (a drug to prevent miscarriage)	Genital abnormalities in both sexes, vaginal and cervical cancer in adolescent females
Isoretinoin (a vitamin A derivative fore treating acne)	Malformations of the head and ears, heart and central nervous system defects, behaviour problems
Phenytoin (an anticonvulsant drug)	Threefold increase in likelihood of heart defect and growth retardation
Streptomycin	Hearing Loss
Tetracycline	Most commonly, staining of teeth; can also affect bone growth
Thalidomide	Deformed limbs, sensory deficits, defects in internal organs, death
Street Drugs	
Cocaine and crack	Growth retardation, premature birth, irritableness in the newborn, withdrawal symptoms
Heroin and methadone	Growth retardation, premature birth, irritableness in the newborn, withdrawal symptoms, sudden infant death syndrome
LSD and Marijuana	Probable cause of premature birth and growth retardation when used heavily; originally implicated in chromosomal breakage, but this effect is uncertain

Maternal Condition	
Age	Teenage women and women over 35 have lighter-weight babies than women in the optimal child-bearing years; likelihood of Down's syndrome birth increases with advancing age.
Alcohol use	Brain and hearing damage, growth retardation, mental retardation, fetal alcohol syndrome
Diabetes	A threefold increase in all types of birth defects, including babies born without a brain, with spina bifida, and heart defects
Malnutrition	Increased likelihood of growth retardation, prematurity, inattention; poor social interactive ability, especially when mother also has a history of malnutrition before pregnancy
Phenylketonuria (PKU)	Growth retardation of brain and head, mental retardation, heart defects
Smoking	Growth retardation, prematurity
Infections	
AIDS (acquired immuno-deficiency syndrome)	Congenital malformations; leaves infant vulnerable to infections of all types
Cytomegalovirus	Deafness, blindness, abnormal head and brain growth, mental retardation
Herpes	Mental retardation, eye damage, deafness, heart defects
Rubella	Mental retardation, miscarriage, blindness, deafness, death
Syphilis	Mental retardation, miscarriage, blindness, deafness, death
Toxoplasmosis	Abnormalities in brain and head growth, mental retardation
Environmental Hazard	
Lead	Miscarriage, anaemia, mental retardation
Mercury	Abnormal head and brain growth, motor incoordination, mental retardation
PCB	Growth retardation
Radiation	Leukemia, abnormal brain and body growth, cancer, genetic alterations, miscarriage, stillbirth

Known teratogens and their effect on a fetus.

Child Psychology: The Modern Science, Ross Vasta, Marshall M. Haith, Scott A. Miller, ©1992, John Wiley & Sons, Inc. p. 127 table 5-1, Reprinted by permission of John Wiley & Sons, Inc.

How a teratogen effects the development of a fetus depends on when the mother is exposed to it. If a mother starts using cocaine during her 22 week of pregnancy when the child's brain is being developed, the child's heart and ears will not be affected because they have already developed and their critical stage has passed; but because the development of the brain is still at a critical period, mental defects may occur. Although a mother should never knowingly expose her unborn baby to teratogens, scientists generally think that a fetus will have a greater chance of survival if exposure occurs during the later weeks of pregnancy.

The Senses of Newborns

Assuming a baby is carried to term and hasn't been exposed to teratogens by the time of birth the baby will be equipped with all the sense organs a grown human has — only smaller. But whether or not a baby can utilize these organs for their intended use is another question.

Newborns are sensitive to pain and touch but these senses are not fully developed. Sensitivity to pain and touch increases rapidly just days after birth. Yet, the ability for a baby to recognize a familiar object by touch alone doesn't usually occur until approximately one year of age (Rose, Gottfried, Bridger, 1981). The ability to recognize objects by touch then steadily improves with age and experience.

Like the senses of touch and pain, the senses of smell and taste also improve within a few days after birth. Babies are able to distinguish familiar smells a week after birth (like the natural scent of their caregiver). And, within two hours after birth, babies are able to distinguish between sweet, sour, bitter and salty tastes (Rosenstein and Oster, 1988).

Studies have shown that all fetuses without hearing defects (evident after birth) respond to sound by 28 weeks into pregnancy (Birnholz and Benacerraf, 1983). But newborns do not have fully developed hearing. Hearing develops steadily until the age of ten when it peaks. After the age of ten hearing slowly worsens (Trehub et al., 1988).

Like all the other senses mentioned, vision improves with age. A baby's vision is actually quite poor at birth. The baby can see, but everything is very blurry. Vision slowly improves and approximates that of adults by the age of one year. Look at the pictures below to see how a newborn envisions the world.

Because it takes babies so long to accurately see the world, it is very important that they can hear and smell so soon after birth. Babies may not be able to recognize their parents by sight but they can recognize them by their voices or even the way they smell.

Motor Development

Motor Development and Newborn Testing

Newborn babies are born with all the limbs and muscles they will need to become mobile adults, but their ability to control their muscles is not fully developed at birth. Motor development, like the development of the senses, gets fine-tuned as babies age. As babies age their muscles get stronger and they gets more practice with manipulating objects. Babies gain control of their motor development in a head-to-toe manner. The first thing a babies master control over is their head movements, next comes the neck, arms, torso and legs. This accounts for the babies' abilities to proceed from looking, pulling up, crawling and eventually walking.

locomotion – a person's ability to move around the environment whether by crawling, walking, dragging, hopping, etc.

prehension – a person's ability to use objects with his/her hands

reflex – an automatic response to a specific stimulus

There are two main categories of motor development in humans: locomotion and prehension. As you already know, newborn babies are not skilled in either of these categories. They cannot crawl, walk or use a television remote control.

But newborns are born with reflexes that imitate prehension. For example, babies can grasp objects put into their palms, but this cannot be classified as prehension because the babies do not purposely use the objects they grasp. It is a reflex. So, placing an object (stimulus) into a baby's hand will make the baby grasp (reflex) the object. The reflex just described is called the palmar reflex. Babies are born with many different reflexes, some are permanent and some disappear within the first year of life.

It is very important for a newborn's reflexes to be tested. The absence of a reflex may signify a serious physical problem or disease. Newborns are also given other tests to determine their physical and mental health. The most prominent tests for newborns are the Apgar exam, the Brazelton Neonatal Behavioural Assessment Scale and the Prechtl test.

The Apgar Exam

Apgar Exam – a method of assessing a newborn's overall health in five different categories: heart rate; breathing; skin tone; muscle tone and response to painful stimuli (the pain is momentary and relatively mild)

Developed in 1953 by Dr. Virginia Apgar, the **Apgar Exam** is widely used as a method of assessing a newborn's overall health in various categories that are rated from zero to two. Zero represents the least optimal score and two represents the most optimal score. The final result is a rating from zero to ten. An extremely healthy baby would get a rating of ten and a baby born dead would get a rating of zero. The Apgar rating informs doctors of which babies need special monitoring during their infancy.

Any exposure to teratogens can lower a baby's Apgar score. Another factor affecting the Apgar score is the mother's mental state. If the mother is clinically depressed or overly anxious, the baby's Apgar score may suffer.

Prechtl Test

Prechtl test – measures some of the same factors as the Apgar, but it also assesses a baby's facial expressions, alertness, reflexes, muscle tone, spontaneous movement and reaction to being placed in various positions

The **Prechtl test** is more comprehensive than the Apgar exam. The Prechtl test may examine more aspects of the baby's health but it is certainly more subjective than the Apgar. For example, when measuring things like facial expressions, it is up to the doctor to determine the relevance of certain facial expressions. Thus, the results on the Prechtl test may differ depending on which doctor performs it, but the results of the Apgar exam will remain consistent no matter which doctor is doing the scoring.

Besides teratogen exposure, other things may decrease a baby's score on the Prechtl test. Babies who have gone through a stressful birth that required the use of implements to remove them from the birth canal sometimes have a lower score than babies who were born without the use of instruments. These instruments may damage the babies' facial muscles, lowering the babies' scores on the facial expression component of the test. Premature babies and babies whose mothers took labour medication also tend to have lower scores.

Brazelton Neonatal Behavioural Assessment Scale

Brazelton scale – assesses babies in four categories: attention and social responsiveness; muscle tone and physical movement; control of alertness; and physiological response to stress

The **Brazelton scale** is the most comprehensive of the three tests mentioned. One of the major differences between the Brazelton and the Prechtl is that the Brazelton assesses the baby's ability to remain alert and become accustomed to repeated stimulation. These measures provide good indicators of babies that may be at risk for developmental delays later in life. As with the above tests, exposure to teratogens is most likely to negatively affect a baby's Brazelton test score.

Organized Behaviours in Infants

As you have just learned, the Brazelton scale is more advanced than other infant test scales because it attempts to assess a baby's organized behaviours (like staying alert when presented with new stimuli). **Organized behaviours** are behaviours that are not random; they have a purpose and an intent. For example, crying is an organized behaviour. Babies cry because they are upset or need attention; babies do not cry when they are content.

Another organized behaviour babies possess is the ability to suck. By sucking on either a nipple or a bottle, babies take nourishment into their bodies. Babies also seem to relax when they are allowed to suck on objects such as pacifiers. So sucking also seems to result in a pleasing experience. Babies are very adept at modulating their sucking behaviour. They suck differently depending on the shape, size and material of the object they are sucking (Dubignon and Campbell, 1968). The sucking behaviour is also coordinated with breathing and swallowing — a very complex behaviour for a baby! Some babies are quick learners and can properly suck as soon as they are born but other babies may need about a week's worth of practice before they become proficient.

Another, often puzzling, organized behaviour in newborns is their searching eye movements. We already know that babies can not see very well at birth so, what exactly are they looking at? The searching eye movements of babies represent their desire to obtain information from the environment. Although they can see very little at birth, they appear to be interested in whatever they can ascertain about their surroundings.

As babies age, they gain more and more organized behaviours such as crawling, walking and talking. But their early organized behaviours — simple though they may seem — represent the infants' ability to act on purposefully their environment and the people around them.

Motor Development Beyond Infancy

Children acquire motor skills very rapidly. Parents are often surprised at what their "little darlings" have learned to do without their notice (such as climbing on counters and finding where all the junk food is hidden). But little research has been done on how these skills are acquired and perfected. Researchers have determined that skill acquisition follows a three-stage process (Gallahue, 1989).

In the first stage, the child attempts the movement in its rudimentary form. The basic movements are imitated but the proper preparatory and follow-up movements are missing or glossed over. In the second, or transitional, stage the child imitates the steps necessary for the movement but the overall effect lacks any finesse. In the third, or mature, stage the child has perfected the movement and it becomes directed and purposeful. At what age the child reaches the second and third stage depends on both muscle development and practice. No matter how often a child practices throwing a baseball, there is little chance the child will be drafted into the major leagues until the muscle power to throw the ball a far distance at a great speed has been developed.

Language Development

Language Models

How children acquire language is one of the most studied topics in developmental psychology. Children can learn to speak a language with relative ease but how are all the complicated rules understood without being specifically explained? Any teenager or adult who has tried to learn a second language realizes how very complicated a process it is. So, how does a child appear to learn it so easily? Three major types of language development theories (psycholinguistic, cognitive and learning), will be described below.

Psycholinguistic Language Theory

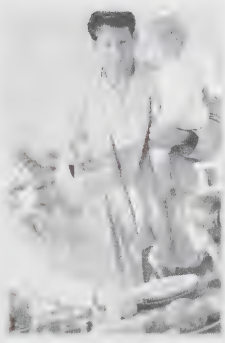
psycholinguistic theory of language development – a belief that humans are born with a genetic structure that helps them acquire language

language acquisition device (LAD) – the genetic structure humans are born with that helps them acquire language

The **psycholinguistic theory of language development** originated in the 1960s and was proposed by a man named Noam Chomsky. Chomsky and his followers believe that humans are born with a genetic structure that helps them acquire language. They believe this because children acquire language at an early age when their reasoning abilities are relatively unsophisticated — too unsophisticated to integrate all the rules of using language. Chomsky termed this genetic structure the **language acquisition device** (LAD). The function of the LAD is to give children the ability to analyze language by its abstract and grammatical structure without having to learn any complicated rules. Although the presence of the LAD has yet to be found in the human body, psycholinguists have made a popular claim to its presence and function.

Cognitive Language Model

Cognitive language theory – a theory that states children learn language by grouping new words into categories that reflect what they know about the world



Cognitive language theory believes that children learn language by grouping new words into categories that reflect what they know about the world. For example, a child may group the word 'drink' into his/her category for action words. In this category may be other words such as 'eat,' 'walk' and 'say.' Into another category labelled agents (or people who can use action words) a child may group words like 'mom,' 'dad,' 'baby' and 'dog.' The more a child learns about the environment the more sophisticated the categories become. When the child can tell the difference between him/herself, family and animals, the agent categories may be split into animal agents (dog' and 'cat), family agents ('mom' and 'dad') and the self as an agent ('baby,' 'me' and 'I'). There is quite a lot of research to support the cognitive theory of language development, as we will discuss later in this lesson.

Learning Language Theory

learning theory of language development – a theory that suggests children learn language through a series of rewards and by watching others

The **learning theory of language development** suggests that children learn language through a series of rewards and watching others. For example, Baby Harry will point at his bottle when he is thirsty. Soon Harry's parents will urge Harry to say something (anything) when he is thirsty. Harry manages to choke out a 'ba' sound and his parents reward him with a bottle. After a while Harry's parents get more demanding and say 'bottle, bottle' every time Harry now says 'ba.' Soon Harry learns that 'ba' is not enough to get him his drink so he learns to say 'bottle.' The process continues as Harry's parents become even more demanding and insist he differentiate between water, juice and milk. Harry soon learns that the only way he'll get what he wants is by learning words and how to use them — so following his parents' examples, Harry learns.

Although learning theorists have demonstrated the importance of the environment in guiding the development of a child's language, they have failed miserably in other areas. Attempts to teach primates to use sign language and keyboard terminals have failed to produce any significant results. It appears primates can use sign language in manners they have been taught, but they are unable to use it to produce novel sentences. In other words, they are imitating language, not manipulating it. Children often use words in a novel manner, such as "I goed to the store." Although 'goed' is not a word it is a novel attempt for the child to put the word 'go' into the past tense, signifying they know the rule and are attempting to manipulate it in a new manner. A primate would never use the word 'goed' because no one would ever teach it the word 'goed,' and primates lack the skills to apply rules to words.

More than likely, each of the major theories comprises a key to the mystery of language acquisition. Perhaps a combination of all the theories, rather than one theory alone, better explains how humans acquire language.

Preverbal Language

As you already know, babies can quite effectively communicate their needs without the use of words. Children do not usually speak their first word until they are about one year of age. On top of this, children do not usually begin combining words until they are 18 months old, so how important is this preverbal period in preparing babies for speech? Some psychologists argue that the preverbal period is not important to acquiring language; others argue that during the preverbal period children are acquiring skills necessary for using language.

Studies show that not only are babies able to differentiate between different sounds in language, the more they hear a language, the better they are able to do so (Eilers and Oller, 1988). Babies are even able to discriminate between voices. Babies show a marked preference to listening to their mother's voice over any other voice or sound (Cooper and Aslin, 1990). This lends support to the notion that babies are actively listening when people are talking to them.

When babies first start making noises, such as crying, these usually signify the babies' discomfort. Around two months of age babies start speaking in simple syllables (such as 'ba,' 'ga' or 'ooo'). As babies age they start to string the same simple syllable together, as if they were repeating the same syllable ('ga-ga-ga-ga-ga'). As babies near their first birthday they then start to combine the different syllables ('ga-oo-ba-oo'). Soon after this they learn to say words (or approximations of words). As you can see, the babies' preverbal language develops over time. It becomes more complicated. This development suggests that the preverbal period resembles a warm-up to using language.

Childhood Language Development

naming explosion – a child learning to speak's ability to acquire new words at an incredible rate

When children start to use language, they acquire different words at a tremendous rate. Psychologists have labelled this period of learning new words the **naming explosion**. Just because children can say a word doesn't necessarily mean they really know what that word means or how to use it appropriately. Following is a list of some odd mistakes children make when they are learning how to use language and methods by which they learn the correct use of language.

Overextensions and Underextensions

overextensions – when a child discovers the name of an object and believes all similar objects are called the same thing

Overextensions occur when a child discovers the name of an object and believes all similar objects are called the same thing. For example, Baby Jill has learned that the pet dog's name is Domino, and every time she sees the dog she points and says, "Domino." But Jill also calls the neighbour's dog Domino and the bear at the zoo Domino and the lion on the television Domino. Jill has overextended the word *Domino*. She has classified anything four-legged with fur as fitting in the category *Domino*. Overextensions tend to support the cognitive view of language acquisition because right now Jill has put all furry animals under the classification of *Domino*, but when she gains more experience with language she will realize that Domino is the name of her dog, not the name of all animals.

underextensions – occurs when a child learning to speak does not recognize an object as belonging to a certain category

Underextensions occur less frequently and they are easier to understand than overextensions. **Underextensions** occur when a child does not recognize an object as belonging to a certain category. For example, Jill may recognize her parents' Ford Taurus as a car. She also knows a Mercury Topaz is a car and a Mercedes Benz is a car, but when she sees a Volkswagen Beetle she refuses to believe it is a car. Because of the Beetle's rounded shape Jill doesn't recognize it as fitting into her category of car. Only things that are boxy and have four wheels represent cars to Jill. Underextensions also support the cognitive view of language acquisition.

Prototypes

prototype – a general model that represents a category

The use of prototypes when acquiring a language is quite common. In the above example, Jill's prototype for a car was something boxy with four wheels. Jill's prototype for a cat may be an image of her neighbour's Siamese cat. Jill will have to expand her prototype of cats to include the lion on television and her aunt's calico. When Jill learns that the lion and her aunt's calico are also cats, she will expand her cat prototype to be furry, four-legged things with long tails. The more Jill learns about cats the more specific her prototype of cats will be. The more specific the prototype, the less chance of underextension.

Modeling

Children learn words through modeling. Parents usually model words for children by saying the word and then pointing at the object. By doing this parents are identifying objects for their children and heightening the children's understanding of that object. Babies actually prefer things that have names. In one particular study babies were more likely to play with toys whose names had been modeled for them than toys that were not given a name (Baldwin and Markman, 1989). This study tends to support the notion that babies like to categorize things in their environment.

The Importance of Feedback

feedback – the information a person is given regarding his/her behaviour

The only way for children to truly understand all the rules of using language is through feedback. For example, Jill may believe that every furry, four-legged thing is called Domino until she's 40 years old, if no one corrects her. Overextensions and underextensions are clarified only when someone corrects them. Prototypes only become more specific if a child is made aware of his or her mistake. Feedback is essential if a child is going to use a language properly. The notion of feedback supports the learning theory of language acquisition in that a child acquires the proper use of language by being praised for appropriate use and by being corrected for misuse.

Emotional Development

Learning Emotional Responses

Newborns seem to have little range when it comes to emotions. Their emotions are mainly concerned with pleasure and discomfort. Babies cry when uncomfortable and smile when happy. Yet, children must learn which emotional expressions are valued and which are not. Caregivers tend to model many positive expressions to a child and, when these expressions are mimicked by the child, the caregivers are pleased and reward the infant with praise. In this manner children learn that positive expressions linked to positive emotions are rewarded.

As children get older they also must learn the appropriate emotional to display in certain situations. Have you ever seen a child fall down while playing? Often the child looks sort of stunned but picks him/herself up. It isn't until someone expresses concern and asks the child "Are you all right?" that the child starts to cry. Although probably not seriously hurt, the child takes his/her cue about how to behave from the environment. This practice is called **social referencing**. When someone asks the child if he/she is all right the child automatically links falling down with not being all right (because why else would someone ask?). And what does the child know to do when he/she does not feel all right? Cry, of course. The connection has been made; the appropriate emotional response to falling down is to cry.

social referencing – when a person looks at the behaviours of others for guidance when he/she is unsure of how to act in a certain situation

Later in life, if the child is a boy, he may learn that society frowns on boys who cry when they fall down. So, even if the boy is hurt next time he falls, he will try not to cry — learning the correct outward physical response even if it doesn't match his inner emotional response. Developing socially acceptable emotional responses (also called **display rules**) is a trial and error process through which children are guided by how society tells them they should react in a certain situation.

display rules – developing socially acceptable emotional responses regarding how one should act in certain situations

Temperament

temperament – a measure of a person's responsiveness and emotional expression in social situations

A little girl who hides behind her mother in social situations may be said to have a shy temperament. But a young boy who runs around introducing himself to strangers at a party is said to have an outgoing temperament. Either way, a child's temperament will determine the types of interactions they have with others and this, in turn, will affect the type of person they become and their outlook on life. For example, a baby boy with an irritable temper (temperament) may squirm and shriek and turn red when he is being held by a person other than his parents. The person will look uncomfortable and eventually pass the baby back to the father or mother. The person will probably not try to engage the baby again. If this type of situation repeats itself often enough, the baby may learn that people are unpleasant and don't want anything to do with him. This attitude may then carry over into childhood and adulthood if nothing happens to change the baby's view of people.

Now, consider a baby girl with a happy temperament, who loves to be held and played with. People will want to play with the baby and have interactions with her. From these exchanges the baby may learn that other people are fun and enjoy being around her. This baby will have a much different outlook on life than the ill-tempered baby.

But how does a baby develop his/her temperament. Some researchers believe temperament is inherited. Twin studies have shown that identical twins are more likely to have similar temperaments than non-identical twins (Goldsmith and Campos, 1986). But the environment can influence even inherited traits. For example, if a baby boy born with a trusting temperament is exposed to abusive parents who scream at and ignore him, it is most likely the baby will learn not to be so trusting of others. Likewise, a baby who is untrusting may learn through the patience and love of his parents to trust. Both genetics and the environment influence temperament.

A baby's temperament is very hard to measure because it is so situational and multifaceted. A baby girl may respond in an ill-tempered manner with strangers but she may also respond very favourably when interacting with her parents. So, is this baby ill-tempered or sweet-tempered? Researchers have tried to develop methods by which to define a child's temperament. Following are three of the most popular methods of defining temperament.

New York Longitudinal Study

The New York Longitudinal Study (NYLS) resulted in a classification scheme developed in the 1950s by paediatricians Stella Chess and Alexander Thomas. The NYLS classifies children's temperaments based on how they respond in nine categories (activity, rhythmicity, approach-withdrawal, adaptability, intensity, threshold, distractibility, mood and attention span persistence). Depending on how a child responds in these nine categories the child is then labelled either difficult, easy or slow to warm up.

A difficult child is unpredictable, uncomfortable in new situations, reacts with intensity to his/her environment and often cries and displays a negative mood (10% of the children studied by Thomas and Chess were determined to be of this type). An easy child adapts well to the environment and new situations and generally displays a happy, positive mood (accounting for 40% of the children studied). A child labelled slow to warm up responds poorly to unfamiliar situations or people, but reacts to his/her environment with little intensity (accounting for 15% of the children studied).

The other 35% of the children could not be classified as any of the three types. This is an obvious drawback to the classification scheme — the ability to classify only infants who fit into extreme categories.

Emotionality, Activity and Sociability Model

The Emotionality, Activity and Sociability model (EAS) defines a baby's temperament based on the three categories in its name. Emotionality refers to how babies respond to negative activity in their environment (like a loud, annoying noise). Activity refers to the amount of energy babies use to explore their environments and engage in activities. Sociability refers to how much babies prefer to be in the company of other people. Their scores on the three dimensions of the scale then define the babies' temperaments.

Rothbart's Model

Developed by Mary Rothbart in the 1980s, this model defines temperament based on two factors: reactivity and self-regulation. Reactivity refers to how a baby responds to stimulation. Self-regulation refers to the baby's ability to control or modulate reactivity. Babies who respond differently are assumed to have different temperaments.

The notion of classifying a child based on temperament is a tricky endeavour. It seems almost impossible to classify a person in a manner that remains consistent over all situations. And, perhaps, it is damaging to try to classify a person's temperament. Such classification can lead to stereotyping — the negative effects of which will be discussed in the next section concerning social development.

Social Development

Babies are born quite helpless. They lack the skills necessary to care for themselves so it is very important for them to foster social relationships with their caregivers. Some researchers believe that babies are genetically designed to elicit a caring response in adults. These same researchers believe that evolution has designed babies to look "cute" so that their parents will want to be around them. Indeed, children need the attention of their caregivers for many years, usually into their teens.

Around six months of age, babies start to development attachments to their primary caregivers and they show a marked preference for the company of those who care for them. Around one year of age babies start to develop attachment behaviours that reflect a fear of being separated from their caregivers. These behaviours may include being frightened of strangers or becoming very agitated when their caregivers leave them. These behaviours signify the first steps in children becoming social beings and realizing the importance of others in their lives.

As you have learned earlier in this lesson, social interactions play a big role in guiding children's language development and appropriate emotional responses. In fact, social interactions are the main influence on a child's social development. Children learn to act appropriately in social interactions through the modeling and feedback of others. But learning to act appropriately in social situations requires learning many different rules and codes of conduct — it is a lot of information for a child to absorb. Children tend to use certain devices to help them navigate themselves in the social world. Following are some of the tools children (and adults) use to help them understand their social world.

Social Inferences

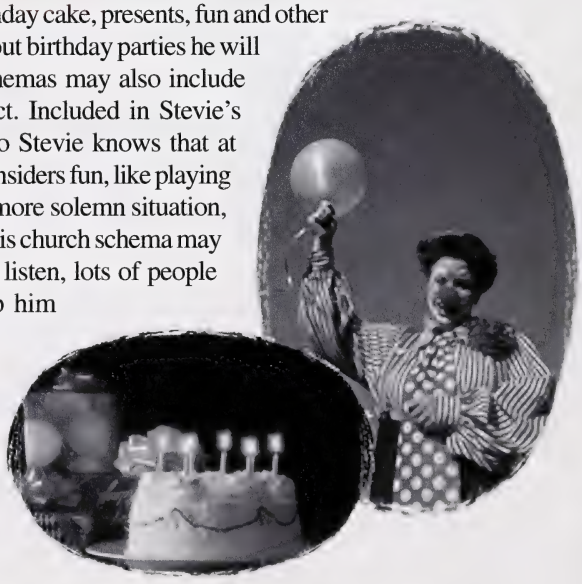
social inference – the guesses people make when they are unsure of how to act in a certain social situation

In order for children to know how to act in new social situations they must make **social inferences**. Social inferences are composed of three steps: gathering information, deciding what information to use to reach a judgement, and integrating the information to make a judgement (Taylor, Peplau and Sears, 1994). For example, Stevie is at a birthday party and he sees the birthday cake on the table. He would really like to eat a piece right away. So, Stevie is faced with the dilemma of sneaking some cake or waiting for an adult to give him some. First Stevie gathers some information. He notices that the other kids at the party are not helping themselves to cake. He also notices that the cake is relatively unguarded and that he may be able to sneak some, but he also remembers that when he takes things without asking he often gets in trouble. Then Stevie also notices that on the same table as the cake there are a lot of birthday presents. Next Stevie must decide what information to use. In the matter of eating some cake, Stevie decides that the information about the birthday presents isn't really relevant so he discards it. Now Stevie integrates the information he has: he might be able to get some cake without being caught but if he does get caught he might get in trouble. And since the other kids aren't eating cake he decides that it is better to wait until he is offered some cake.

Schemas

schemas – are sets of descriptors we use to classify and categorize an object, place, event, animal, person, etc. For example, our schema for a car may be: wheels, metal frame, drives, steering wheel

With experience Stevie will develop a **schema** for birthday parties. His schema may include things like balloons, birthday cake, presents, fun and other children. Whenever Stevie thinks about birthday parties he will recall everything in his schema. Schemas may also include important information on how to act. Included in Stevie's schema of birthday parties is fun, so Stevie knows that at birthday parties he can do things he considers fun, like playing and laughing. Stevie's schema for a more solemn situation, like church, may be much different. His church schema may include things like quiet, dress nice, listen, lots of people and Sunday. Stevie's schemas help him decide how to behave in certain situations and what to expect in them.



Scripts

scripts – a sequence of behaviours one must perform when in a certain situation

Scripts guide social behaviour and are very valuable in helping a person know what to do in a certain situation. For example, if Anna's mom wants to teach her to use the phone, the two of them will develop a script for her to follow. The first step would be to know the number she needs to dial. The second step would be picking up the phone and dialling the number. The third step would be asking for the person to whom she would like to speak. The fourth step would be having a conversation and the last step would be saying good-bye and hanging up the phone. Scripts become so ingrained in our memory that we don't even know when we are following them. Do you use the phone by carefully following each step of your phone script? Actually you do, you're just not aware of it anymore.

Heuristics

heuristics – general rules people follow in social situations

If you are driving and you see a red light your heuristic for red lights informs you to stop. Children must develop heuristics for operating in social situations. Children soon learn that when someone offers their hand the heuristic is to shake that hand. Good parents will also inform their children of heuristics for certain situations such as always saying thank you when someone gives them something and always wearing a helmet when riding a bicycle. Like scripts, heuristics become so ingrained that they are second nature. People will automatically follow their heuristics without even thinking about them.

The Harmful Effects of Stereotyping

stereotypes – schemas that narrowly and negatively attempt to define a group of people

In their rush to understand the world, children (and sometimes adults) like to categorize people, objects and things. Schematizing things gives people information on how to act and what to expect but relying too heavily on schemas may lead to stereotyping. Stereotypes are schemas that narrowly and negatively attempt to define a group of people. When you think of the word blonde what other words come into your head? Some of the words that may come into your head are hair, girl, bleach, sexy, young and dumb. These are all prevalent stereotypes of blondes. Have you ever been told a dumb blonde joke? If you have, you're probably aware of how widely recognized that stereotype is. The problem with stereotypes is that they are widely believed and accepted but very rarely true. For example, is every blonde you know dumb? Is every blonde you know sexy? Does every blonde you know bleach his/her hair? The answer to all these questions is no. Blonde is a hair colour; it has no relation to intelligence or sex appeal. Think how

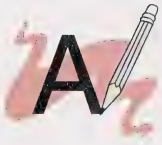
ridiculous the same stereotype would sound if it were applied to people with brown hair. You would never believe it or give it a serious thought. Yet, the blonde stereotype is so ingrained in our own culture that some people actually believe it despite its improbability.

We have many stereotypes about all sorts of people and we seem most willing to believe a stereotype that is about a group of people that are seemingly different from themselves. Think of some of the stereotypes you've heard about people from different cultures or groups whether they be Asian, American, First Nations, black, white, rich, poor, straight, gay, boy or girl. Stereotypes exist for every group of people imaginable even though they can not possibly be true of every person in that group. Sure you may know a 'dumb blonde' but you may also know some less-than-brilliant redheads, brunettes and black haired people too.

Stereotypes have a negative effect on the people who believe them and on the people they are directed at. The people who hold the stereotypes often appear uninformed to others and may be preventing themselves from truly getting to know some interesting people. The people at whom the stereotype is aimed may experience unfair prejudice and even self-fulfilling prophecies. For example, a young blonde teenager may start to believe the stereotype that blondes are dumb. Because he believes this, he doesn't study for any of his tests because he truly believes he is going to fail no matter what he does because he is blonde. By not studying for his tests, the boy fails all his courses and believes that he failed because he is blonde. When in truth the boy failed his exams only because he didn't study. And the more the boy fails, the more he believes the stereotype that all blondes are dumb.

self-fulfilling prophecy *– when someone believes a stereotype about him/herself and behaves in a manner to fulfill that stereotype*

So although schemas help us categorize and classify our environment, they can also harm us and others if they develop into stereotypes.



Turn to Assignment Booklet 2 and complete the assignments for Section 1, Lesson 2.

Section Two

Intelligence and Personality

Lesson 1: Intelligence

Theories on the Different Aspects of Intelligence

How we define intelligence is defined has changed drastically over the last 100 years. Intelligence is no longer defined only by how well a person does on a written test. Modern-day psychologists agree that intelligence encompasses much more than they previously thought.

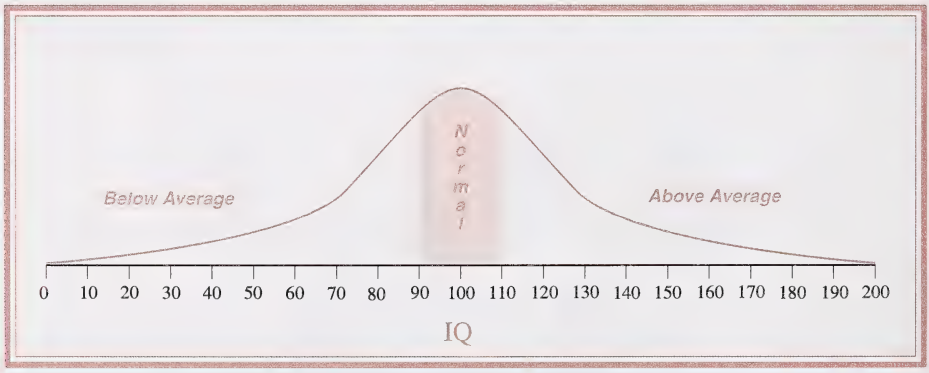
The Intelligence Quotient

The notion of testing humans in order to rate their intelligence was first proposed in 1905 by Alfred Binet and Theodore Simon. The two men developed a test that they believed would help educators distinguish "more intelligent" children from children who were "less intelligent."

In 1916 Lewis Terman, a psychologist working at Stanford University, designed a system of categorizing intelligence in adults as well as children. Terman called his test the Stanford-Binet test as a tribute to Binet and Simon's earlier work. The test was designed to take anyone's final test score and determine his/her intelligence based on that person's age. This measure of intelligence became known as the **intelligence quotient or** IQ. ***IQ is measured as a person's mental age (as determined by the test) divided by his/her chronological age (the age s/he is when they take the test), which is then multiplied by 100.***

$$IQ = MA/CA \times 100$$

A person, whose IQ equals 100 is said to have normal or average intelligence. Any score above 100 is supposed to reflect above average intelligence, and any score below 100 is supposed to reflect below average intelligence (see the chart below for the correlating intelligence level for various IQ scores).



Determining intelligence strictly based on IQ scores has become widely criticized. Most psychologists now agree that an IQ score measures only one facet of intelligence: a person's ability to take a test. Later in this lesson you will learn more about the negative side of IQ testing.

Sternberg's Theory of Successful Intelligence

Robert Sternberg proposed his **Triarchic Theory of Intelligence** in the 1980s. Sternberg believed that intelligence should be based on three different components:

1. The way a person generates intelligent behaviour. This is a person's ability to analyze a situation. For example, say you are at the grocery store and you are ready to pay for your purchases and you are in a hurry. You would probably want to analyze the checkout lines and choose the line with the least people in it.

2. The degree to which a person's behaviour suits the situation. If you decide to wait in the shortest line your behaviour will suit the situation. If you decide to walk out of the store with your groceries and not pay for them, your behaviour is not only criminal but also inappropriate for the situation.

3. A person's ability to analyze and apply appropriate behaviours in novel situations within a small time frame. This means that Sternberg is interested not only in a person's ability to analyze a situation and apply an appropriate behaviour, but he is also interested in how quickly that person can do these in a new situation.

As you can see, Sternberg's theory of intelligence is far different from the outdated notion of intelligence that simply measured how many answers a person got correct on an IQ test. Sternberg believes that it isn't important how much intelligence a person has, what is important is how the person uses that intelligence.

Gardner's Theory of Multiple Intelligences

In 1983 Howard Gardner proposed the notion that intelligence was diversified and multifaceted. He suggested that one person may be intelligent in one area (like math) and another person may be intelligent in another, totally-unrelated area (like music) but both exhibit equally important intelligences. Gardner suggested that humans can posses seven very different intelligences: linguistic (a talent for speaking to others); spatial (an ability to construct and design, like an architect); logical-mathematical (an ability to manipulate numbers); musical; body-kinesthetic (a talent for moving one's body like an athlete or dancer); interpersonal (a talent for relating to other people); and intrapersonal (a talent for relating to one's self).

Gardner was among the first psychologists to broaden the definition of intelligence beyond that of just mathematical, logical and verbal reasoning.

Gardner's Intelligences

Intelligence	Possible Occupation	Core Components
Logical-mathematical	Scientist Mathematician	Sensitivity to and capacity to discern logical or numerical patterns; ability to handle long chains of reasoning
Linguistic	Poet Journalist	Sensitive to the sounds, rhythms, and meanings of words; sensitivity to the different functions of language
Musical	Composer Violinist	Abilities to produce and appreciate rhythm, pitch, and time; appreciation of the forms of musical expressiveness
Spatial	Navigator Sculptor	Capacities to perceive the visual-spatial world accurately and to manipulate the mental representations that result
Bodily kinesthetic	Dancer Athlete	Abilities to control one; body movements and to handle objects skillfully
Interpersonal	Therapist Salesperson	Capacities to perceive the visual-spatial world accurately and to manipulate the mental representations that result
Intrapersonal	Poet Writer	Ability to control one's own feelings and the ability to discriminate among them and draw upon them to guide behaviour; knowledge of one's own strengths, weaknesses, desires, and intelligences
Naturalist	Biologist Evolutionary theorist	Ability to detect patterns and organization in nature
Spiritual	Preacher Monk	A concern with the spiritual, with origins, and with the afterlife
Existential	Philosopher Theologian	Interest in the purpose and meaning of existence[1]

Note: The last three intelligences are recent addition; the last two are based on incomplete or uncertain evidence and are not yet clearly distinguished.
J. Kane (Ed.), Education, Information & Transformation, Upper Saddle River, NJ: Prentice-Hall, (Pearson Education ©1999)

Hunt's Theory on Problem-solving Intelligence

Unlike many other psychologists studying intelligence in the 1980s, Earl Hunt was more interested in studying the individual differences in problem solving. Hunt believed that intelligence should be measured by analyzing an individual's unique ability to solve a problem. Hunt was interested in how the individual represented the problem in his/her mind and the various strategies the person could develop to solve the problem. Hunt was also very interested in finding the best use for each person's unique style of problem solving.

Vygotsky's Zone of Proximal Intelligence

Lev Vygotsky had a very forward thinking understanding of intelligence. Although he died in 1934 his theories on intelligence are still highly regarded today. Vygotsky believed that a child's intelligence should be measured by his/her zone of proximal development. Vygotsky believed the **zone of proximal development** was the difference between what a child could do on his/her own and what they could do with teaching and instruction. Therefore, Vygotsky believed that an intelligent child would be able to learn from others.

zone of proximal development – the difference between what a child can do on his/her own and what they can do with teaching and instruction

Cattell's Two Factor Theory of Intelligence

Raymond Cattell believed that people have two types of intelligence - **fluid intelligence** and **crystallized intelligence**. Cattell believed that the kind of intelligence measured by standard IQ tests was important, but he also believed a person's "street smarts" were equally important when considering intelligence.

fluid intelligence – the type of intelligence a person is born with. In other words, the kind of intelligence not learned in school—a person's "street smarts"

crystallized intelligence – the type of knowledge a person learns in school

Recognized Tests of Measuring an Individual's Intelligence

Benefits and Drawbacks of Group and Individual Testing

Intelligence tests may be administered to one person at a time (individually) or to a group of people at a time. Group tests are less expensive to administer and can usually be marked quite easily with a computer. (In Canada, students are given group tests in grade six, grade nine and grade twelve or thirteen that assess their abilities in math and English.) Although group tests are quick and easy to administer, their inability to measure many facets of intelligence, other than how well a person has learned to take a test, is limited. For example, a group test would not be able to measure most of Gardner's multiple intelligences like interpersonal or kinesthetic intelligence. Individual intelligence tests, on the other hand, are more expensive and time consuming to administer but they are more able to measure different types of intelligence. Below are some of the most popular individual and group intelligence tests.

The Revised Stanford-Binet Test

As you learned earlier, the Stanford-Binet test is a traditional intelligence test that gives an IQ score. The test is administered individually and measures intelligence in four separate areas (verbal reasoning, quantitative reasoning, abstract/visual reasoning and short-term memory). This test is usually used to identify individuals who may be considered "gifted" or who have serious learning problems. Different tests have been made to cover a wide age range.

Weschler Intelligence Scale for Children (WISC-III)

The Weschler Intelligence Scale for Children (WISC-III) is very much like the Stanford-Binet. It is also administered individually but it yields what is called a full-scale IQ score-full scale because it also measures vocabulary, block design ability, number span and the ability for a child to understand. Children who take the test must both answer verbally and perform certain tasks. As with the Stanford-Binet, the WISC-III is used to identify children who may be considered "gifted" or who may have serious learning problems. The WISC tests went through many stages of development (the III represents the fact that this is the third edition of the test). In 1974, a revised version of the test, the WISC-R was developed to counteract any cultural bias (as will be discussed later in this lesson). The third version of the test, the WISC-III has also been adapted to eliminate cultural bias, and it is the version most widely used today. An adult version of the test is also available. Below is an example of some of the tasks given in the WISC-III.

The Weschler Intelligence Scale for Children, (3rd. ed.) (WISC-111)

VERBAL TASK	PERFORMANCE SCALE
- subjects are asked general questions about things most children would know - children are asked why some things are done in certain ways to check their understanding and comprehension - oral mathematical problems are asked of the children as well as the recitation of orally presented numbers in correct sequence and reverse sequence - children are asked to describe how objects and/or concepts are similar to each other - subjects are to define concepts of increasing difficulty etc...	- after being shown pictures, children are asked to tell what is missing from the picture - subjects are asked to put in the proper order, a series of photographs which tell a story - children assemble puzzles and duplicate designs of play-blocks - the child is asked to pair objects together using a pre-specified guide - pencil mazes are presented and the subject is asked to find the way out - subjects are asked to find symbols in such a way as to determine mental processing speed and visual search abilities

Peabody Picture Vocabulary Test-Revised

The Peabody Picture Vocabulary Test-Revised is an un-timed, individual test that usually takes about 15 minutes to administer. The examiner will say a word and the person being tested must point to one of four pictures that represent the word. The words are arranged from least to most difficult and the test concludes when the person answers incorrectly six times in a row. This test only measures vocabulary and is used to identify adults and children with severe communication difficulties or with poor reading skills.

Draw-A-Person Test

The Draw-A-Person Test is a group test in which a child is asked to draw a person as well as he/she can in a certain time frame. The drawing is then scored according to specific criteria. This test is supposed to assess the mental development of the child as well as provide an indicator as to the child's emotional well-being. Below is an example of two ten year-old boys' tests. You can see a large difference between the two drawings. The drawing on the right signifies a serious developmental delay.

(a)

(b)

Cognitive Abilities Test

The Cognitive Abilities Test (CogAT) is a group test that can be given to students in grades three to thirteen. It gives three different scores for verbal reasoning, non-verbal reasoning and quantitative reasoning. It is used to assess how well a child is doing in school compared to other children of the same age.

Grade Level Standardized Tests

As mentioned earlier in this section, students in Canada are given grade level standardized tests in the sixth, ninth and final grade. These tests are very much like the CogATs and assess how well a student has done in math and English compared to other students in the same grade.

The Biased Nature of IQ and Standardized Tests

Culture-specificity and Bias of Tests

The use of any tests that yield a standard IQ score have come under constant scrutiny ever since they were first developed because certain patterns exist concerning who does or doesn't do well on these types of tests. Psychologists have found that people who are white and come from middle to upper class backgrounds tend to do better on these tests than people from any other race or socio-economic class. It is not that white people from middle-class backgrounds have higher intelligence; it is just that these tests were designed by and for people like them.

If a child from a busy city in Canada and a child from a third world country, were to write an IQ test, who would do better on the test? It is quite obvious that the child from Canada will do better. He is familiar with the language, can read and write and has had the benefit of the Canadian educational system. The child from the third world county, on the other hand, may never have learned to read or write because where he lives it is more important that he work to try to help his family. It does not mean that the child in Canada is necessarily smarter; it just means that the child in Canada is more equipped to write the test. On the other hand, if both children were put in a desert with no readily available food and water, which boy do you believe would do better on such a survival test? The boy from the third world country would do better, not necessarily because he is smarter but because he has more experience with trying to survive in harsh conditions.

Raymond Cattell, the man who developed the ideas of fluid and crystallized intelligences, recognized the way intelligence tests discriminated against the less privileged and people from other cultures. Cattell proposed and developed a Cultural Fair Intelligence Test, in 1944, to measure fluid intelligence ("street smarts") rather than crystallized intelligence (the type of intelligence learned at school). Although this culture-fair test and others like it have reduced the bias in intelligence testing, they have not eliminated it.

Practice Makes Perfect on Standardized Tests

Another criticism of intelligence tests or standardized tests is subjects can study for them. The more preparation a person does or the more times a person takes the test, the better that person will do on the test. In this sense, these tests don't necessarily measure how intelligent a person is but rather, they measure how well a person has studied for that particular test.

Various Factors Influencing Test Performance

To base a person's intelligence on the results of one test seems quite unfair considering all the things that may affect that person's test results. Factors like the amount of sleep a person has had the night before, his/her mood and whether or not that person has had a nutritious meal that day can all affect that person's test scores.

Uses of Intelligence Tests and the Ethical Issues Surrounding Them

Labelling, Stereotyping and Self-fulfilling Prophecies

Earlier in the course you learned about the harmful effects of stereotyping and self-fulfilling prophecies. Just as easily as a person can be stereotyped by his/her hair colour, race or gender, a person can be stereotyped by an IQ score. Often IQ scores are used in schools to determine which child goes in the gifted classes and which child goes in the classes for low achievers. But, what if, a child named Fred writes an IQ test when he is tired, hungry or upset? Fred may do poorly on the test and may be given the label "low achiever" based on his test results. Fred may then be placed in a class with other children who did poorly on the test. All of the other children in Fred's school will know that Fred has been put in the "special" classes and will consider him to be less smart than the kids in the "normal" classes. Fred, himself, will realize he has been put in the low achieving class and may start to believe he isn't as smart as the other kids so he will stop trying in school. Teachers will start to realize that Fred is unwilling to try in school and they will continue to believe he is a low achiever. Years will go by and Fred will fall further and further behind in school-all because he was too tired, troubled or hungry to do well on an IQ test. In this sense IQ scores can literally change the course of a person's life!

labelling – when a person is stereotyped by one feature alone

Using an IQ score to categorize a person by a certain term such as low achiever, developmentally delayed or gifted is a form of labelling. In the above example, Fred was labelled as a "low achiever," even though he did poorly on one test. This label then led to the stereotype that Fred was "dumb." Fred and his teachers believed this stereotype and it led to a self-fulfilling prophecy in which everyone, including Fred, believed he was unable to do well in school. Of course, the scenario may work in the favour of another child who does uncharacteristically well on an IQ test and gets put in gifted classes, but the child who is labelled as a low achiever will suffer greatly especially if judged on one test alone.

IQ Correlations

IQ and Birth Order

Over a hundred years ago a psychologist named Francis Galton recognized a trend that many noted intellectuals were the first-born children in their families. Many researchers that followed found similar correlations that the first-born children had higher IQs than the other children in their families, did better academically, had a higher need to achieve and were more likely to attend college.

IQ Stability Across Different Ages

At one time, psychologists believed that a person's IQ remained constant throughout his/her life. Yet, in 1987, Flynn examined IQ data from 14 countries, spanning over 50 years and discovered that IQ scores increased as people got older. He termed this correlation the **Flynn Effect**.

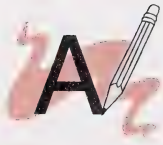
Flynn Effect – the phenomenon where a person's IQ score increases as they age

IQ and Family Income

Psychologists have found a correlation between higher IQ scores and an increased family income. This is somewhat of an unfair correlation because so many other factors come into play. A wealthier family is more able to provide expensive books and learning toys for their children. A wealthier family is also more likely to hire tutors to help their children. In some cases of extreme poverty a family may not be able to feed their children, adequately which would, as discussed earlier, certainly affect the children's IQ scores.

IQ Correlation with Relatives' IQs

Researchers have also found that if a child's parents have high IQs, then the child will, most likely, have a high IQ. This correlation is also quite deceptive. Parents with higher IQs have probably been well schooled and have gone to college or university. Their children will, most likely, benefit from their parents' knowledge and be expected to do as their parents have done; whereas a parent who has never completed high school may have problems helping his/her children with their schoolwork.



Turn to Assignment Booklet 3 and complete the assignments for Section 2, Lesson 1.

Lesson 2: Personality Theories

What is personality?

Psychologists the world over have tried to find the perfect definition of personality. Some believe that a personality is what people must develop to get along in the world. Others believe that a personality is a mathematical combination of various factors. Still others believe that a personality is the self that someone chooses to show others.

This inability to develop a definition for personality that can be accepted by everyone has led to the development of a branch of psychology called personality psychology. Psychologists who study personality (or personality theorists) have developed numerous theories over the past century to try to determine what makes up a person's personality. Although some theorists' views are more widely accepted than others, one solid personality theory has yet to be universally accepted.

Potential Problems with Studying Personality

One of the biggest problems associated with developing one universally-accepted personality theory is that such a theory is almost impossible to prove in a scientific manner. It seems that since so many variables are involved in developing a person's unique personality, accurately accounting for them all is quite impossible.

Possible Determinants of Personality

Psychologists believe that people have as many determinants for personality as we have branches of psychology. Psychologist B.R. Hergenhahn believes that personality theorists, over the years, have stressed eight main factors as being major contributors in developing a person's personality. They are as follows:

- Genetics – our genes combine in various ways and determine our personalities, even before we are born.

- Environment – all the factors to which we are exposed after we are born contribute to determine our personalities.

- Learning – personality theories based on learning factors suggest that we learn to develop certain personalities based on the responses we get from others.

  Traits – trait psychologists believe that we develop, learn or are born with certain traits that combine to make our personalities.

- Existential-humanistic considerations – some theorists, who believe that personality is developed through existential or humanistic considerations, believe that people choose to develop certain personalities based on their philosophical outlooks. For example, If people believe in being kind to others, they shape their personalities so that they show kindness in all their activities.

- Unconscious mechanisms – theorists who believe that unconscious mechanisms determine people's personalities believe that people have no choice in how their personalities develop. Circumstances, maybe even those no longer remembered, have determined one's personality.

- Cognitive factors – theorists who believe that cognitive factors influence a personality, believe that people manipulate their personalities based on goals they wish to achieve.

- Sociocultural factors – are factors such as the culture a person has grown up in, and the values held by one's family. Theorists who believe that sociocultural factors determine personality believe that a person develops a personality based upon sociocultural influences.

- Personality as a composite of factors – many theorists believe that all the above factors contribute in the development of a person's personality.

Sigmund Freud

Sigmund Freud, born in Austria in 1856, was considered a brilliant student and went to medical school at age 17. He became very well known in the world of psychology. His theories on treating psychological problems are still valued by practicing psychologists. Freud's theories are considered to be groundbreakers in the field of psychology. He is best known for advocating the notion that unconscious mechanisms are responsible for the development of a person's personality.

Perhaps the biggest errors Freud made as a medical doctor involved his advocacy for cocaine: prescribing and writing many papers on its beneficial (this was before the drug's harmful effects were widely known). Freud, himself, used the drug heavily for years. When the harmful effects of cocaine use became apparent to medical researchers, Freud lost much respect from his medical colleagues.

The Id, the Ego and the Superego

Freud believed that the human mind was composed of three sections: the id, the ego and the superego. The id contains a person's most instinctual desires. The id is concerned only with personal pleasures, no matter the consequences. Unless the id's desires are satisfied, it will create a constant need in a person. The ego turns the id's desires into reality. If a person's id desires food, it is the ego's job to satisfy the id's desires in a realistic manner by getting food. When the ego fulfils the id's desires, the id is satisfied and quietened. The superego, on the other hand, monitors how the id's needs are met by the ego. The superego follows very strict rules and always strives for approval from others.

For example, if a man's id desires food, it creates a strong urge, a hunger. The ego, sensing the id's desire, directs the man into a restaurant. But, if the restaurant is very busy and the man must wait 20 minutes before he can get a table, the id's desire for food will grow stronger and stronger, and the ego will try to find a way to satisfy the id's desires right away. Perhaps the ego will come up with the idea to eat the food right off another man's plate. The superego, though, will stop the ego from directing the man to do this because the superego has learned that such behaviour is unacceptable. In this instance, the superego will restrain the ego from carrying out its plan. The ego may then come up with another idea-like going to the restaurant across the street where it will be served right away. The superego agrees with that action and allows the ego to proceed. When the man finally eats, his id's need for food will disappear until the next time the man is hungry.

Psychosexual Stages

Freud believed that all children had to go through similar experiences before they reached adulthood. He classified these experiences as occurring in five unique stages of their lives. He believed that any problem in adulthood could be traced back to something going wrong during one of these stages. Freud also believed that if a problem in adulthood were to be fixed, the childhood source of that problem must be unearthed and dealt with in order to restore mental health. In other words, Freud believed that all problems in adulthood stemmed from bad experiences in childhood.

1. The oral stage. Freud's first psychosexual stage is the oral stage, which occurs during a person's first year of life. Freud believed that in the first year of life, babies get pleasure from eating and drinking, all oral activities involving the mouth. If a baby enjoyed oral stimulation too much or was not fed regularly it could develop problems later in life, such as believing anything or saying rude and sarcastic things.

2. The anal stage. This stage occurs during the second year of life when a child is being toilet trained. Freud believed that certain problems with toilet training could lead to problems in later life such as being overly generous or overly stingy with love, friendship and possessions.

3. The phallic stage. This stage occurs during a child's third-fifth years of life. These are the ages when boys and girls realize they are different from each other. If a child experiences any issues regarding his/her sex organs during this stage, it will signal problems with the opposite sex when the child is older.

4. The latency stage. This stage lasts between the sixth and twelfth year. This is a stage where psychosexual development is suspended.

5. The genital stage. This stage occurs during puberty and solidifies what kind of grown-up a child will become, based on all his/her experiences during the first three psychosexual stages.

Psychoanalytical Techniques

Because Freud believed that all adult problems stemmed from childhood, he also believed that if an adult were to achieve mental health, he/she would need to confront and recognize those childhood problems. Freud developed a certain type of psychological therapy, called psychoanalysis, in order to help a client to discover and confront childhood issues.

free association – a therapeutic technique used in clinical psychology. During free association the client will mention anything that comes to his/her mind

During psychoanalysis Freud would use a technique called **free association**. During free association the client would mention anything that came to mind. Freud would then take note of any particular topics the client would not like to talk about. Freud believed that these topics were most significant in leading a client back to discovering past problems.

dream analysis – a technique used in clinical psychology. The client tells the therapist his/her dreams and then therapist helps the client translate their meaning

Another technique Freud used to discover the source of a client's problems was **dream analysis**. In dream analysis a patient would discuss his/her dreams and with the help of Freud would determine the dream's meaning and discover what the mind was trying to say. Freud believed that dream analysis was especially important in discovering what was in a person's unconscious mind. Both techniques, free association and dream analysis, are still used by psychotherapists.

Criticisms

validity – how well an experiment actually tests what it is supposed to

Besides criticisms from his medical colleagues, Freud's theories also received criticism from the world of psychology. Some theorists believe Freud's theories focus too much on childhood. Others believe that his theories lack scientific **validity** because they cannot be scientifically tested. Still others believe that Freud's theories are blatantly sexist against women. Yet, Freud is still considered a pioneer in psychological therapy.

Carl Jung

Carl Jung, born in Switzerland, in 1875, came from a long line of clergymen, but decided to study psychiatry. Jung was a friend of Freud's until Jung expressed some doubts about Freud's theories. The two men stopped communicating with each other, ending their years-long friendship. The end of the friendship led Jung to enter a dark period of his life full of depression and near madness. When he emerged from this four-year absence, he came back with a new, individual theory on personality.

Components of Personality

Jung, like Freud, believed that three components make up the personality: the ego, personal unconscious and collective unconscious. Jung believed that the ego represents everything about which human beings have conscious thoughts. These would include thinking, remembering and perceiving. The personal unconscious represents all the things that people were once conscious of in their pasts but have now forgotten. The personal unconscious includes disturbing thoughts that couldn't be dealt with when they first occurred. These may be emotions felt when a parent unjustly punished, criticized or abused a child. The collective unconscious represents the past thoughts and experiences of everyone's previous ancestors. The collective unconscious represents a person's evolutionary experiences. These experiences are unconscious but may resurface during times of stress or danger, for example, inborn fears of encountering strangers, large animals or dangerous weather.

Jungian Techniques

The word association test was used (although invented by Francis Galton and Wilhelm Wundt) by Jung to give the therapist a clue into thoughts held in a person's personal unconscious. Jung would present a client with certain stimulus words that were developed to trigger potential memories in the personal unconscious. A client's unusual response to the word (this could include stammering, repeating the word or failing to respond) would signal the therapist that s/he was very close to discovering a disturbing unconscious thought.

Like Freud, Jung also used dream analysis to treat his clients. But unlike Freud, Jung believed that dreams were meaningful on their own and did not require a therapist to interpret them. Jung believed that one of the functions of dreams was to let neglected parts of the psyche represent themselves to the individual.

Criticisms

Jung's theories have been criticized for being too fanciful as well as being scientifically unprovable. Yet Jung was applauded for designing truly original theories that were based on spirituality and ancestry.

Erik Erikson

Erik Erikson was born in Germany in 1902. After he finished high school he decided to become an artist and explore Europe. After many years he took a job in Vienna, in a school run by Anna Freud (Sigmund Freud's daughter, a child psychologist). From Anna Freud he learned the art of psychotherapy and began practicing child therapy, although he had no medical training or university degree. Although Erikson was later taken under the wing of a Harvard professor who urged Erikson to obtain a doctorate, Erikson quit university before he obtained his degree because he thought further education was unnecessary. The lack of a degree did not stop Erikson from teaching at Harvard where he was a popular teacher. Erikson died in 1994.

Eight Stages of Personality Development

Erikson believed that all humans went through eight stages of development. During each stage, humans are faced with life decisions that will determine the people they will become. Individuals must strike a delicate balance among the alternatives if they are to become well-adjusted human beings. How they, themselves, and the people around them influence their behaviour will dictate which of the two alternatives they pursue. The stages are as follows:

1. Infancy: developing trust versus mistrust. During this stage infants require care from others if they are to survive. If infants are cared for by loving, nurturing parents they will develop a sense of trust in other humans. If, on the other hand, their parents are abusive or uncaring, they will develop a sense of mistrust in other humans.

2. Early childhood: developing autonomy versus shame and doubt. This stage occurs during the first, second and third years of life. In order for children to develop a feeling that they are in control of their own lives (autonomy), their parents must guide their behaviour but not rule it. Healthy children would have a sense of being in control of themselves but would also recognize that they must also follow the accepted rules of others. If children were too independent, they would be unaware of how their behaviour affects others. On the other hand, if children are ruled too much by their parents, they will always be needy of others.

3. Preschool age: developing initiative versus guilt. This stage occurs during the fourth and fifth years of life. During this stage children start trying to initiate behaviours on their own. They try out new things based on their wants and imagination. If children are encouraged to try out their own ideas they will become self-sufficient. If, on the other hand, children are ridiculed by their parents and those around them every time they try out a new idea, the children will start to feel guilty about thinking for themselves.

4. School age: developing industry versus inferiority. This stage occurs during the sixth to eleventh years. During this stage children are at school, learning the basic skills they will need to become productive adults. If children learn how to work well with others as well as how to work well individually, they will have learned industry. If the children have not learned these skills then they will have no confidence in their ability to contribute to a group or to work individually. If, during this stage, children feel inferior about their basic skills it will negatively affect their working lives and possible success when they are adults.

5. Adolescence: developing identity versus role confusion. This stage represents the transition between childhood and adulthood and occurs from ages 12-20 years. This is the stage in which children search through all the possible identities available to them as adults. These identities include how they will treat others, what they will do for a career and, in general, what kind of adults they will become. By the end of this stage, if the young adults cannot decide on what kinds of people they want to be, then they will suffer from role confusion (an inability to choose a role in life). Young adults who have to deal with role confusion may spend years trying to commit to different jobs and personalities, leaving them unsettled and confused about their life's purposes.

6. Young adulthood: developing intimacy versus isolation. This stage occurs between the ages of 20-24. If people feel secure in their identities they then can pursue love and intimacy with another person. If they are still suffering from role confusion they will withdraw from others and feel that they are alone in the world. This sense of isolation stems from being unable to make special connections with others.

7. Adulthood: developing generativity versus stagnation. This stage occurs between the ages 25-64. If, between these ages, a people have developed strong identities, become industrious workers and have made intimate connections with others, they will be able to pass on their knowledge to other generations (resulting in generativity). On the other hand, people who are lacking in all these qualities, will not have any valuable wisdom to offer to future generations.

8. Old age: developing ego integrity versus despair. This stage occurs after the age of 64. If people are able to look back on their lives with satisfaction, without regret and are able to face the thought of death without fear, then they have reached ego integrity (they feel fulfilled with the person they have become). If they fear death and regret the choices they have made, they will feel that their lives have been wasted and experience great feelings of despair.

The first five stages of Erikson's eight stages of personality development roughly corresponded to Freud's stages of psychosexual development. Although the stages had some similarities, Erikson focused less on sexuality and more on social demands put on individuals. Therefore, Erikson and Freud generally disagreed on what, precisely, occurred during the various stages.

Criticisms

Although Erikson's stages of personality development addressed important conflicts that everyone must face, his theory did receive much criticism. Critics believed that Erikson was overly optimistic about how humans would want to live. Other critics believed that Erikson's theory was simply his way of preaching to others how they should live. Still others criticized Erikson's theory as being unscientific because it resisted true scientific testing.

Gordon Allport

Gordon Allport was born in the United States in 1897. Allport, while studying at Harvard University, went from being a lacklustre student to achieving straight As in his final year. He graduated from university with a degree in economics and philosophy. At the urging of a friend, he decided to do graduate work in psychology. Allport studied many of the personality theories, and when he started to develop his own theory, he borrowed from other theorists. Allport was unique in that his own theory combined many other theories that were thought to be totally separate and distinct.

Trait Psychology

trait – a mental structure that initiates and guides reactions, accounting for the consistency in one's behaviours

Allport believed that a person's personality is composed of traits. Allport defined a trait as a mental structure that initiates and guides reactions, accounting for the consistency in one's behaviours. For example, a man who had the trait of being aggressive might choose to argue or to pick fights with people when he is annoyed. His aggressiveness trait will initiate and guide his behaviour when he is annoyed. If the man is unable to control his aggressiveness, then the trait will determine how he acts under certain conditions.

Allport believed that numerous individual traits combine to make a unique person. Each person is composed of thousands of traits that interact in unique ways. This belief demonstrates that no two people have the same combination of traits.

According to Allport traits are used to define certain aspects of an individual. To classify an individual as having any one trait, that individual would have had to display that trait on more than one occasion. Examples of some traits are intelligence, aggression, compassion, shyness, deception and friendliness.

Criticisms

Because traits are not physical structures and cannot be found in the human body, their existence is very hard to prove. Allport's trait theory therefore, was criticized as being unscientific and unprovable.

Raymond Cattell

Raymond Cattell was born in England in 1905. Cattell entered university when he was 16 where he studied physics and chemistry. Cattell went to graduate school and studied with a notable psychologist who was interested in integrating psychology and statistics. After receiving his PhD, Cattell moved to the United States and continued his mentor's efforts of scientifically testing personality theories with statistics. Cattell died in 1998.

Types of Traits

Cattell was interested in developing a personality theory that could be scientifically tested. His first step in achieving this goal was to develop a list of traits that could be used to categorize individuals. Cattell believed that people had ability traits, which determined how well a person worked towards and achieved goals. One of the most important ability traits Cattell studied was intelligence. Cattell also developed a list of temperament traits that categorized the emotional and reactional responses that people gave in certain situations. Temperamental traits may include how quickly people respond in a crisis, how irritable they are and how persistent they are in getting their own way. As well as these two categories of traits, Cattell developed others that he thought would define all aspects of human behaviour.

Factor Analysis

Factor analysis was Cattell's way of determining scientifically what type of personality a person may have based on some of his/her traits. Cattell studied people's traits and tried to identify correlations between the traits. By determining whether or not certain traits were related, Cattell hoped to be able to predict all the traits a person may possess based on only a few indicator traits.

Criticisms

Although Cattell developed a scientific way to predict a person's personality, other scientists thought it to be rather confusing. Critics also argued that Cattell's predictions could not be completely accurate because behaviour, as a whole, is far too inconsistent to be predicted.

B.F. Skinner

B.F. Skinner was born in the United States in 1904. In university he studied English literature and was known to be a great prankster. When he graduated, Skinner wanted to be a writer. After two years of trying to write, Skinner gave up and entered graduate studies in psychology at Harvard. It wasn't until after Skinner earned his PhD. that he began writing books based on learning theories. Skinner died in 1990.

Behaviourism and Reinforcement

Skinner believed that all human behaviour was learned. He believed that behaviour that continued did so because it was rewarded. Other behaviours don't continue because they aren't rewarded. Behaviours that are rewarded are reinforced so that the individual wants to keep on performing them. In other words, people learn to keep on performing behaviours that are rewarded and they learn not to perform behaviours that aren't rewarded.

Consider this example: you are walking into a busy building and you see a man with his hands full coming in after you. You decide to hold the door open to help the man in. If the man says "Thank you," then you are rewarded for your kind behaviour and are more likely to hold the door open again when you are in a similar situation. But, if the man doesn't thank you but instead says, "How dare you? You don't think I can open my own door?" In this scenario, your kind behaviour is not reinforced so maybe you think twice about holding the door open for someone else. Now, say that you consider the rude man's behaviour a fluke and decide to hold the door open for more people. What if every person you hold the door open for is rude to you? You would soon learn that if you hold the door open for other people they will be rude to you; so, you stop doing it.

Operant Conditioning

operant conditioning – a technique of using reinforcement to strengthen a person or animal's desire to perform certain behaviours

Operant conditioning is Skinner's term for using reinforcement to strengthen a person's desire to perform certain behaviours. Skinner believed that if you wanted a behaviour to continue you rewarded or reinforced it. Likewise, Skinner believed that if you didn't want a behaviour to continue you ignore or don't reinforce it. Skinner's techniques are widely used to encourage or discourage certain behaviours in children and animals.

Criticisms

Skinner became very famous for developing personality theories based on learning and reinforcement. His theories held significant weight in the scientific community because they could be easily tested with scientific methods. Skinner's many criticisms came from those who believed that his theories were too general. Skinner easily applied the same theories to animals and humans. Some of his critics found this quite insulting.

Dollard and Miller's Drive-reduction Hypothesis

John Dollard and Neal Miller are psychologists who, like Skinner, believed in the strong effect reinforcement had on behaviour. The two psychologists developed a theory called the drive-reduction hypothesis. Dollard and Miller believed that organisms were generally controlled by drives: the drive to eat, the drive to sleep, the drive to have sex, etc. They believed that, once put in motion, these drives grew stronger and stronger, putting the organism under some stress and strain. In order to reduce this tension the drive would have to be satisfied. Once the drive was satisfied the organism would be rewarded with a reduction in tension.

Sociobiology

Darwin's natural selection and survival of the fittest

survival of the fittest – the notion that all organisms go through evolutionary changes, and those with the characteristics best suited to their environment survive to pass their genes on to their children

Charles Darwin was one of the first scientists to propose a theory of evolution. In his theory he suggested that all creatures on earth went through evolutionary changes in order to survive. He called this notion **survival of the fittest**. Darwin argued that in order for a species to survive, it would have to be able to adapt to a changing environment. This adaptation would include being able to learn quickly and have the physical attributes necessary to survive. Darwin believed that creatures that were unable to adapt to their environments would be wiped out, and those who were able to adapt would give birth to offspring and guarantee that their genes would live on through their descendants.

Psychologists who believe in survival of the fittest are called sociobiologists. They believe that people with adaptable personalities will be able to pass their genes on to their offspring, while people who are unable to adapt their personalities will die out. For example, a man who has a nice, caring personality and good manners is more likely to attract girlfriends than a man who is rude, violent and abusive. In this case the nice man will more likely have an opportunity to have children and pass on his genes, whereas the rude violent man will have a much harder time finding anyone willing to bear his children.

E.O. Wilson and D.P. Barash's Extension

Wilson and Barash were two of the first psychologists to start applying sociobiology theories to human behaviour. Between the two, they came up with sociobiological explanations for rape, suicide and many other abnormal human behaviours. They suggested that men whose genes were so inferior that they could never get a mate without using force, committed rape. They also suggested that people who committed suicide did so because their genes were, in some way, inferior and not worth trying to pass on to further generations. Needless to say, these theories were quite controversial and made many people take offence at their implications.

Carl Rogers

Carl Rogers was born in the United States in 1902. He was always an excellent student, and in college he was one of ten students chosen to live in Peking, China for six months. This experience had a profound effect on Rogers. It laid the foundation for his later theories that stressed caring and helping others to be the best they could be. Rogers is considered a pioneer in developing more personal techniques when dealing with clients seeking therapy. Rogers died in 1987.

Actualizing Tendency

Rogers believed that all humans have a need to survive, grow and enhance themselves. This enhancement consists of striving to become better people-whether it is intellectually, socially or philosophically. Rogers believed that humans are basically good and always strive to become better people.

Client-centered Therapy

Rogers was the innovator of a drastically new kind of therapy, which he called client-centered therapy. Rogers believed that the client would be able to solve her/his own problems with the help of the therapist. He believed it was the therapist's job to try to understand the client's view of the world. This was unlike other theories of the therapist-client relationship that focused on the therapist being the only person who could pinpoint the client's problems.

Criticisms

One of the major criticisms of Roger's theories was that they took a much too positive view of humanity. Critics argued that Roger's theories were overly optimistic and could not account for, or completely ignored, the darker side of human nature. So, although Roger's could have been praised for his faith in the goodness of humankind, this faith also led to his greatest criticisms.

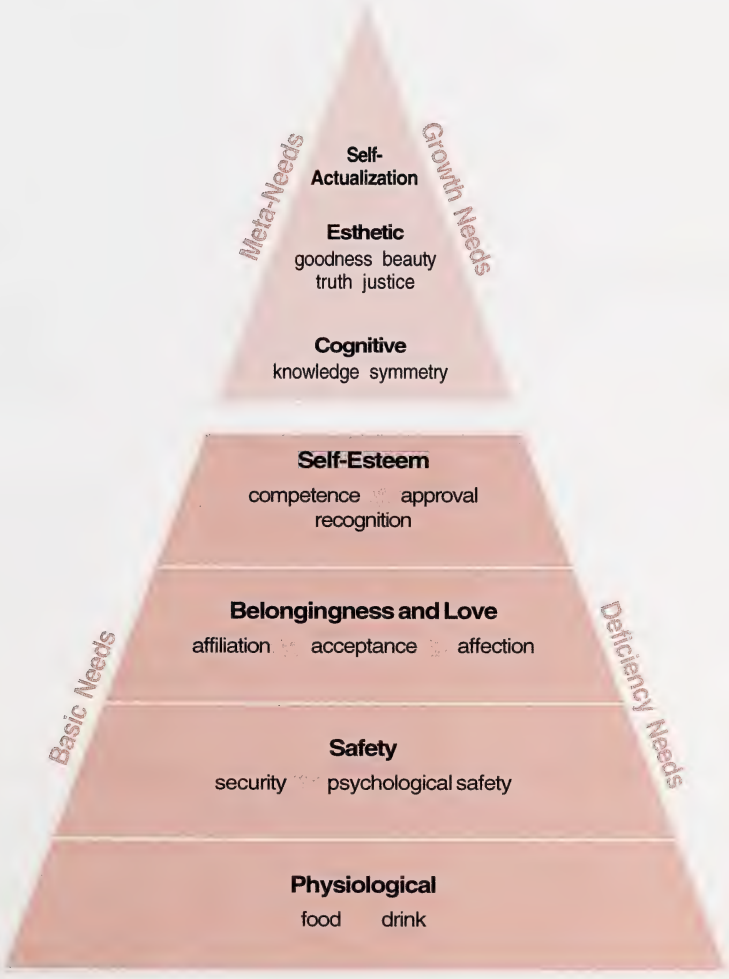
Abraham Maslow

Abraham Maslow was born in the United States in 1908. Maslow had a very difficult childhood. His mother was cruel and abusive and his father was a drinker who took pleasure in telling everyone his son was ugly and stupid. Contrary to his father's assessments, Maslow graduated with a PhD in psychology. While in school, Maslow developed the notion that the study of psychology was rather cold and unfeeling. This became the basis for Maslow's later humanistic theories that focused on the positive qualities in humankind. Maslow died in 1970.

Hierarchy of Needs

One of Maslow's most famous contributions to psychology was his hierarchy of human needs. Maslow believed that people needed to satisfy certain levels of needs, in a certain order, if they were to become the best people they could be.

The lower needs on his hierarchy are mainly concerned with physiological needs and the higher needs on his hierarchy are associated with emotional states: happiness, peace of mind and a rich inner life. Maslow believed that, before a person could move to a higher stage, all the lower needs must be met. He also believed that the higher needs could only be attained in later life. Maslow's hierarchy is as follows:



1. Physiological needs. Physiological needs are directly related to human survival. They include food, water, sex and sleep. Maslow believed that if these needs were not properly met a person would spend his/her life obsessed with them and would be unable to move on to any other stage in life. For example, if a woman is starving, she must spend all her time and energy on finding enough food to keep her alive; she would have little opportunity to think about anything else.

2. Safety needs. After the physiological needs are met, safety needs become important. They include establishing structure, order and predictability in one's life. These needs are related to feeling settled in one's life.
For example, a homeless person with no job will constantly be looking for a stable job and a permanent place to live. He/she will be unable to focus on anything else until these needs are met.

3. Belongingness and love needs. At this stage a person desires companionship, a supportive family life and an intimate relationship. Maslow believed that if these needs were not met a person would be consumed by loneliness and have no sense of belonging.

4. Esteem needs. The esteem needs include acceptance and recognition from other people as well as from oneself. This kind of recognition will boost a person's feelings of value and self worth.

5. Self-actualization. Self-actualization is the highest level on Maslow's hierarchy. Maslow believed that very few people actually ever attain this level. Self-actualization is characterized by a full acceptance and knowledge of one's self and one's own destiny.

Characteristics of Self-actualizing People

Maslow set out very specific criteria to determine whether or not a person had attained self-actualization. Maslow developed these criteria by studying qualities of the most grounded and well-balanced figures throughout history. Two of the figures he believed to be self-actualized were Albert Einstein (a famous physicist) and Eleanor Roosevelt (an American first lady and crusader for human rights). Some of Maslow's criteria for self-actualization are as follows:

- The ability to perceive reality accurately and fully. This requires being able to see things as they are without letting personal needs or weaknesses cloud the view.
- The ability to accept one's self and others without judgment. This requires finding value in one's self and not resorting to sham or phoniness.
- The ability to be concerned with problems that don't involve themselves. This requires putting other's problems and circumstances before one's own.
- Being creative.
- Having a strong ethical sense. This includes knowing the difference between what is right and wrong, and always being aware of the consequences of one's behaviour.

Criticisms

Although Maslow's theories regard humans as caring beings who are always trying to improve themselves, Maslow's theories received much criticism for being overly optimistic about human nature. Critics believed that Maslow's theories did not account for people who do terrible things nor for those who do not care for others. Other critics accused Maslow's theories of lacking a scientific basis. They believed that, although his theories were intriguing, he had no real way to test or prove them.

Turn to Assignment Booklet 4 and complete the assignments for Section 2, Lesson 2.

S3 Section Three

The Body and Behaviour

Lesson 1: Heredity and Environment

For hundreds of years psychologists have engaged in the nature versus nurture debate. This debate is concerned with what most influences a person's behaviour and personality. Psychologists on the nature side of the argument believe that our behaviour and personality is all predetermined by our genetic make up. On the other hand, psychologists on the nurture side of the argument believe that the environment and influences a person is exposed to most determine his/her behaviour and personality. And still some psychologists believe both nature and nurture contribute to a person's behaviour and personality. This lesson will provide a brief history of the nature versus nurture debate, as well as arguments for both sides.

"David certainly has his father's eyes," proclaims Grandma as she fondly watches her grandson play with his building bricks. "Those beautiful dark eyes with the long lashes are just like Joe's."

"Yes, I guess they are, but David has my father's curly hair. Isn't it funny that my hair has to be poker straight, but David manages to get his grandfather's curly hair!" laments David's mother.

"My! Look at how he puts those bricks together. He's really good with his hands. Mark my words. That boy will be a builder someday," declares Grandma. "It's in his blood. There have been builders in our family for three generations, and now there's another one coming up."

"Oh! Well, look at his long fingers. He's a born piano player. I just know that he'll be a great pianist like my Uncle George. Almost everyone in my family is very musical."

David, becoming frustrated with his bricks, begins to throw them across the room. His grandmother and mother rush over to stop him.

"Now, now, Dear," soothes Grandma. "You musn't get angry and throw your bricks. I guess you get that from your mommy's side of the family..."

This seems to be a good place to interrupt this conversation.

Have you ever heard people discussing a child in this way? Very probably you have. Whether or not the people involved realize it, they are arguing the age-old questions of heredity versus environment.

What is it that gives David his brown eyes and his curly hair? What will determine whether he becomes a builder or a pianist?

Genetics

Heredity determines the developmental potential of all living organisms.

The study of heredity is *genetics*. The science of genetics began to flourish around 1900. The basic unit of genetics is the *gene*. This is the unit of heredity that determines particular characteristics. The gene is a part of a molecule of DNA.

DNA (dioxyribonucleic acid) is found in the nucleus of living cells. It occurs in threadlike structures called *chromosomes*. Each DNA molecule is organized into specific units that carry the genetic information necessary for the development of a particular trait. These units are the genes. A gene can reproduce itself exactly, and this is how traits are carried between generations.

The *genotype* is the entire structure of genes that are inherited by an organism from its parents. An organism receives one-half of its genes from its mother and one-half from its father. The environment interacts with this genotype to determine how the genetic potential will develop.

Before the study of genetics became a science, it was believed that heredity worked from conception until birth, then stopped, and environment took over during the time between birth and death. Because every cell in an organism's body contains genes, geneticists have been able to demonstrate that every characteristic of an organism from conception until death is the result of interaction between the genes and the environment of that organism.

We can think of every organism and each part of every organism as a joint function of the interaction of at least three factors: time, heredity, and environment. A living creature must have a life-span (time) in which to grow and develop. The growth and development must be controlled by heredity. The nature of this growth and development is guided by the environment.

Heredity sets definite limits to the development of an organism. These limits cannot be exceeded no matter what advantages the environment offers. For example, no amount of musical training and practice is going to make David into a great pianist unless he actually has the necessary innate ability. He may learn to play the piano reasonable well if he is provided with the right environmental influences, but only if he has inherited the correct genes can he become a truly great pianist.

Chromosomes and Genes

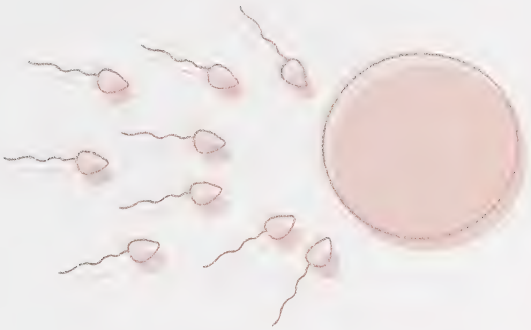
Chromosomes are long threadlike structures which are contained in the nuclei of cells. In all except the reproductive cells of humans, there are forty-six chromosomes. These chromosomes exist in pairs. Except for the reproductive cells, the billions of cells in a single human body all share identical chromosomes.

Chemically each chromosome consists of a double stranded coil of DNA. These DNA molecules control chemically every activity of the cell in which they exist. RNA or *ribonucleic acid* is also manufactured in the nucleus. If a chemical distortion takes place within the cell's nucleus, various forms of inherited physical and mental abnormalities can result.

The reproductive cells are different from all the other cells in the human body in that they do not contain forty-six chromosomes. When an ovum or sperm is formed, the pairs of chromosomes separate; only one of each pair is donated to the germ cell. Thus each germ cell or reproductive cell contains twenty-three single chromosomes. This process is called *reductive cell division*. At conception when the ovum and the sperm unite to form one cell, single complementary chromosomes from each of the two parents unite to form a new pair of chromosomes. These will then be duplicated exactly in each cell of the new human. This means that two different lines of heredity contribute equally to the new offspring so that it will be similar to both its mother and father and yet not exactly like either of them.

One of the twenty-three pairs of male chromosomes does not consist of two equal-sized chromosomes but rather of a long one and a short one. The long one is called the *x* chromosome and the short one the *y* chromosome. The *y* chromosome determines maleness. Females do not possess a *y* but instead possess two *x*'s. During the reductive division process in males, the *xy* chromosome splits and divides, the *x* going to one sperm and *y* to another. If an *x* sperm penetrates an ovum during fertilization, an *xx* combination results, producing a female. The chances are just as good, however, that a *y* sperm will penetrate the ovum, producing an *xy* combination and a male.

Thus it is the sperm (and therefore the father) that determines the sex of the offspring.



Sometimes the new individual gets an extra chromosome. When this happens, some deviation from the norm results. People with Down syndrome are first and foremost human beings who have recognizable physical characteristics and limited intellectual endowment which are due to the presence of an extra chromosome 21.

The estimated incidence of Down syndrome is between 1 in 1,000 to 1 in 1,100 live births.

There are three main types of chromosome abnormalities in Down syndrome:

1. The vast majority of children with Down syndrome (approximately 95 percent) have an extra 21 chromosome. Instead of the normal number of 46 chromosomes in each cell, the individual with Down syndrome has 47 chromosomes. This condition is called trisomy 21.

2. The second type is called translocation since the extra 21 chromosome is attached or translocated on to another chromosome, usually on chromosome 14, 21, or 22. If translocation is found in a child with Down syndrome, it is important to examine the parents' chromosomes, since in at least one-third of the cases, a parent may be a carrier of the translocation. This form of chromosome error is found in 3 - 4 percent of the individuals with Down syndrome.

3. Another chromosome problem, called mosaicism, is noted in about 1 percent of individuals with Down syndrome. In this case, some cells have 47 chromosomes and others have 46 chromosomes. Mosaicism is thought to be the result of an error in cell division soon after conception.

Although many theories have been developed, it is not known what actually causes Down syndrome. Some professionals believe that hormonal abnormalities, X-rays, viral infections, immunologic problems, or genetic predisposition may be the cause of the improper cell division resulting in Down syndrome.

It has been known for some time that the risk of having a child with Down syndrome increases with advancing age of the mother; i.e., the older the mother, the greater the possibility that she may have a child with Down syndrome. However, most babies with Down syndrome (more than 85 percent) are born to mothers younger than 35 years. Some investigators reported that older fathers may also be at an increased risk of having a child with Down syndrome.

It is well known that the extra chromosome in trisomy 21 could either originate in the mother or the father. Most often, however, the extra chromosome is coming from the mother.

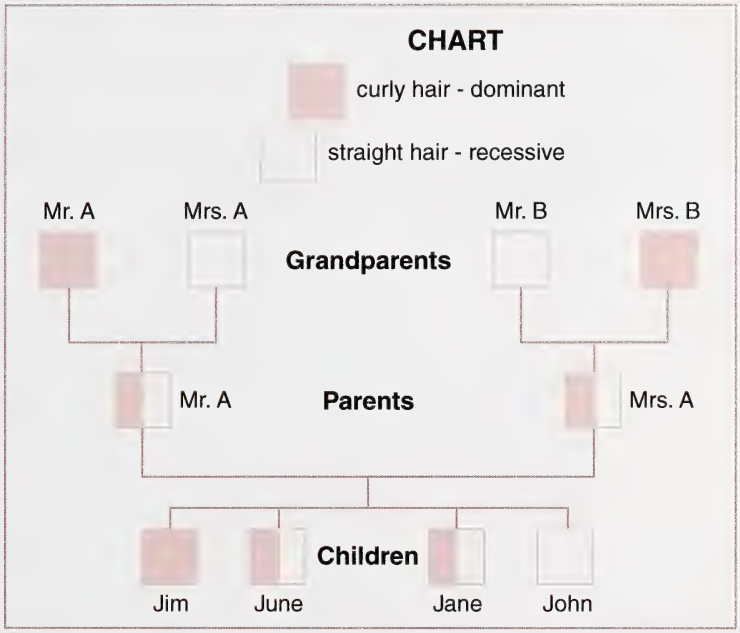
Each chromosome consists of at least a thousand genes. Some traits depend upon a single gene, but more of them arise from the combination of a large number of genes. The sum of all the biological characteristics that an individual is capable of transmitting to his or her offspring is called a *genotype*. For example, if one parent contributes a gene for brown eyes and the other parent contributes a gene for blue eyes, the fertilized egg contains blue-brown as a genotype for eye colour.

What actually appears in the individual is the *phenotype*. For example, if an individual's genotype for eye colour is blue-brown, his phenotype probably will be brown; that is, his eyes will be brown.

Dominant and Recessive Genes

The reason the individual with a genotype for eye colour of blue-brown will have brown eyes is that the genes for brown eyes are *dominant*, and those for blue eyes are *recessive*. A dominant gene is one which, when paired with a recessive gene, dominates. That is, its character shows up in the offspring. The dominant gene dominates, but it does not eliminate the recessive gene.

In later generations when two recessive genes come together, the recessive characteristic again appears.



Genotypes:

1. Grandparents - Mr. A, Mrs. B - curly, curly
   Mrs. A, Mr. B - straight, straight

2. Parents - Mr. A, Mrs. A - curly, straight

3. Children - Jim - curly, curly
   June, Jane - curly, straight
   John - straight

Phenotypes:

1. Grandparents - Mr. A, Mrs. B - curly
   Mrs. A, Mr. B - straight

2. Parents - Mr. A, Mrs. A - curly

3. Children - Jim- curly
   June, Jane - curly
   John - straight

The first laws of heredity were formulated one hundred years ago by Gregor Johann Mendel, an Austrian monk. He crossed several varieties of garden peas and from this came to certain conclusions about inheritance. If a pea flower contains only the genes for red, it is called *pure* red; if it has only genes for white, it is called *pure* white; and if it contains genes for both red and white, it is called a *hybrid*. The hybrid will be red because the red gene is dominant and the white gene is recessive.

Although characteristics such as height, hair colour, skin pigmentation etc. are inherited from one's parents, parents simply pass on characteristics which they inherited from their parents, who inherited them from their parents, and so on back through all the generations of life. If you have your mother's nose, it's not because your mother has reproduced her nose in you. You both have the same nose because you share a common ancestry. Parents are simply the immediate carriers of the characteristics of their ancestors.

If a characteristic is possessed by the parents but has not been possessed by preceding generations, this characteristic will not be passed down to their children. For example, even if you dehorn cattle for generations, each new generation will still have horns.

Genetic kinship can vary all the way from that of identical twins, who have all forty-six chromosomes in common, to that of individuals who have only a single chromosome alike. If two individuals do not have any chromosomes in common, they are not genetically related.

The Influence of Heredity on Behaviour and Physicality

How Genetics Affect People Physically

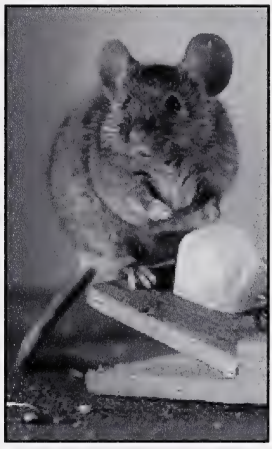
A person's genes are what makes him/her unique as a human being. It is estimated that there are between 30,000 and 100,000 genes for every cell that makes up the human body. These genes combine to make different combinations of skin colour, hair colour, eyelash length, height, tooth shape, or anything else that makes a person.
Half of your genetic makeup comes from your mother's side and half comes from your father's side. Your mother's and your father's genetic contributions react with each other determining which traits (like hair colour and eye colour) you will have. Similarly your genetic makeup will also influence how any children you may have will look. Your physical characteristics, in this sense, are determined before you are even born.

Studies of Heredity

Animal Experiments

A variety of animal experiments have been performed to study patterns of heredity.

One of these is an experiment to test the role RNA plays in memory. Rats were taught to go to a food cup whenever a click sounded. The RNA from these rats was injected into the brains of untrained rats. These untrained rats showed a significant tendency to go to the food cup when a click was sounded, even though they hadn't been taught to respond to the click.



Another experiment involved a psychologist testing rats for intelligence by having them run through a maze for food.

Through research into heredity patterns of animals, geneticists and psychologists are able to relate their findings to human genetics.

Studies of Human Families

In the past, studies of heredity in human families were done extensively; however, today many of the results of these studies are no longer accepted as valid scientific evidence. The reason for this is that people involved in the studies often relied on hearsay rather than on provable facts. These studies generally did not take into account the influence of environment. There are too many uncontrolled variables in using family trees to study heredity for the results to be of scientific value.

Practical Applications for Controlling Heredity

Eugenics is the science that deals with methods for improving the hereditary qualities of a species; it is a subject with legal, social, religious, and scientific implications.

Some people advocate the practice of eugenics to control propagation among people of lower intelligence.

Unfortunately, even if positive and negative eugenics were practised, some aspects of heredity are beyond control - people of superior intelligence can produce a defective child.

Heredity and Maturation

Maturation is the process of physical growth and development of an organism over a period of time. Behaviour of all types must wait until the maturation of organs and systems has proceeded far enough to make the behaviour possible. Nearly all learned behaviour requires that a vast amount of maturation precede it. For example, a newborn baby cannot learn to walk; his/her body structure has to develop through maturation before this can happen.

Maturation is not the same as learning. Changes due to maturation are determined by heredity. Because of heredity, different species of animals have different rates of maturation. For instance, an eight-week-old puppy can do most of the things a grown dog can; but an eight-week-old baby cannot survive if not cared for.

Studies on the Effect of Maturation on Human Learning

Most of the studies of the effect of maturation on human learning have been done with identical twins. Because identical twins have the same degree of intelligence, differences in their rates of learning tasks at different ages can be attributed to maturation.

A classic study that illustrates the effect of maturation is the one involving Hopi Indian babies. Traditionally, Hopi babies are strapped to cradle boards for the first nine months of their lives; they have very little opportunity to exercise the muscles needed for walking. However, not all Hopi babies are confined like this. A study show that all Hopi babies, whether or not they have been strapped to cradle boards, walk at almost exactly the same age – about fifteen months. Maturation is the critical factor.

The Notion of a Pure Genetic Influence on Behaviour

People who believe in a pure genetic influence on behaviour believe that our personalities and behaviour are all pre-determined by our genes. This means that the type of person we will become — our likes, our attitudes, potential, temperament, personality — are all programmed into us before we are born. For example, if Becky likes the colour red, hockey, vanilla ice cream and is considered to be a very sweet-natured person, she is so because her genetic make-up has pre-determined her to be that way.

Gesell's Maturation Theory

Developmental psychologist, Arnold Gesell believes that child development, and everything it includes, is entirely pre-determined by genetics. Gesell believes that children will learn to speak, relate to others and become fully-functioning adults with or without the help of parents, teachers or the environment.

Rousseau's Nativism

Jean Jacques Rousseau, a French philosopher who lived during the eighteenth century, is most famous in the psychology arena for his ideas on the "noble savage." Rousseau believed that humans were born completely good and that it was society that inspired evil in them. In this sense, Rousseau was ahead of his time, believing in the interaction of both nature and nurture.

Itard's "Wild Boy of Aveyron" Studies

In Aveyron, France in 1800, hunters were stalking prey in a forest when they happened upon a "wild boy." The boy was described as being a savage without any of the refinements of a civilized person. The French government persuaded Jean Itard, a young doctor, to civilize and study the child. Itard did not favour the notion that a person's behaviour was predetermined so he eagerly went about trying to "civilize" the young boy. The boy, who Itard named Victor, was covered in scratches and animal bites, and couldn't speak. Itard worked very hard with Victor for five years with limited success. Victor was only able to learn to speak a few words, keep himself clean and become affectionate to others. Itard, feeling his "experiment" with Victor was a failure, gave up trying to teach the boy and left Victor's care to his housekeeper. Victor, the real-life Tarzan, died at the age of 40.

Because Victor never learned to communicate fully, no one discovered how he came to live in the forest or how he was able to survive on his own. Modern day psychologists have closely researched the case of Victor and have reached many differing opinions. Some believe that Victor was developmentally delayed or autistic, and that is why he never learned to speak or properly interact with other humans. Others argue that Victor could not have been developmentally delayed or he never would have survived for so long on his own. The same scientists also suggest that Victor may have missed important critical periods in his development (as discussed earlier in the course) and that is why he never became verbal or socially developed. Either way, the tragic case of Victor lends support to the notion that environment is very important in determining how we behave, and that genetics alone does not provide the entire blueprint for our behaviour and personalities.

Studies on the correlations between heredity and behaviour are still being conducted. With scientific technology progressing rapidly, scientists have been able, through genetics and advanced forms of brain x-rays, to pinpoint many biological factors for mental disorders and abnormal behaviours. Although today's scientific research may show us possible correlations, these correlations can never be stated as the one-and-only cause of mental illness or abnormal behaviour. (Remember that a correlation means a relationship between two variables — it does not mean that one variable causes another variable.)

When scientists were first able to identify human chromosomes, the possibilities seemed limitless for finding genetic abnormalities that caused any number of disorders and diseases. Some scientists even attempted to explain abnormal behaviours as being a factor of genetic abnormalities. In the 1970s researchers found a larger than normal number of male prison inmates had an genetic XYY abnormality (a normal male should have an XY genetic structure). This finding led scientists to make a correlation that the XYY abnormality was linked to violent or criminal behaviour.

Although this theory was popular for awhile, other theories for why there might be a large number of men with the chromosomal abnormality in prisons arose. It was discovered that these men were also taller than normal and produced more testosterone than men with an XY genetic structure. Studies also linked increased amounts of testosterone with increased aggressiveness in males. So in this case, it was not directly the XYY genetic structure that caused these men to be violent, but rather the increased testosterone was correlated with more aggressive behaviour. Scientists found a correlation between violence and the XYY genetic abnormality.

Environment

Heredity provides the person with the potential to develop in a certain way; this development, however, is dependent upon the experiences with which the person is provided. These experiences are that person's *environment*.

Environment includes all the conditions inside and outside a person that in any way influence behaviour, growth, development, or life processes.

Prenatal Influences

For the nine months before birth, the baby is dependent on the mother's body. Although the mother's blood does not flow through the baby's veins, many things do pass from the mother to the baby. If the mother is carrying diphtheria, typhoid, or syphilis germs, these may succeed in passing from the mother's body to the child. Excessive use of alcohol or narcotics by the mother will damage the child. Even maternal cigarette smoking seems to have some effect on the baby. If a pregnant woman catches German measles it is a mild disease to her, but it can be injurious to her unborn child. As the mother's body fights the disease, toxic substances are built up in her bloodstream and then reach the developing embryo. The child may be born blind or deaf or with any of a number of other defects.

Recent research shows disturbing evidence of the effect of malnutrition during pregnancy on the development of the baby. Besides being physically smaller than the babies of properly nourished mothers, undernourished babies have retarded brain and gland development. Because of this, these babies start life at a disadvantage.

Influences of the Environment After Birth

Moderately severe and prolonged under-nutrition in children, particularly those under four years of age, can produce alterations in brain activity which may never be corrected. The earlier the malnutrition occurs the greater the effect and the less likelihood there is of recovery when adequate nourishment is supplied.

Children who were malnourished in early life tend to have lower intelligence test scores, and they seem to be especially retarded in language development. If individuals are properly nourished, not only are brain cells stimulated by the nutrients provided, but they also are responsive to the stimuli to which they are exposed. A malnourished person tends to be apathetic to his/her environment.

Social Environment

Social environment includes all the human beings who in any way influence us. Our "direct contact" social environment includes family, friends, work and school associates; our "indirect contact" environment includes radio, television, newspapers, books, and even our imagination and daydreams.

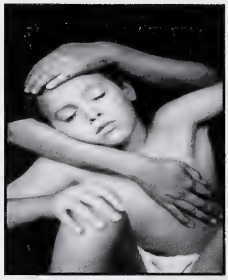
Studies show a direct relationship between intelligence test scores and the conditions under which children live. Isolation of the kind that excludes school, books, social life, news media, etc. is associated with lower I.Q. scores. Adequate and early sensory stimulation is necessary for adequate intellectual development.

Children's intelligence test scores will change when their environments change. Just as their score will go up if they are placed in a culturally superior environment, so will it decline if they are moved to a culturally deprived environment. The amount an individual's I.Q. will rise by changing the environment is of course limited by one's inherited intellectual potential.

The influence of environment, like the influence of heredity, is a life-long process.

The Influence of Environment on Behaviour and Physicality

How The Environment Affects People Physically



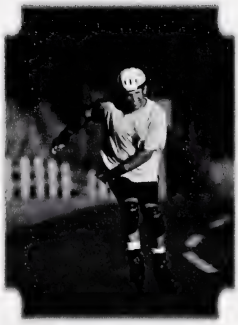
If our genetics determine what we are going to look like before we are born, then how can the environment possibly affect what we will look like physically? As you have already learned in this course, teratogens taken during a fetus' development can effect a baby's mental and physical development. Alcohol, especially, has been known to cause physical defects in children. Fetal Alcohol Syndrome is a disability found in children whose mothers drank during important developmental stages while they were pregnant. Physically, these children usually have a smaller birth weight and never catch up to an average size. Facial features are quite specific with small eyes that are wide set and an upturned nose with a flat bridge. Fetal Alcohol Syndrome is clearly a case where the environmental factors take precedence over genetics.

Another theory on how the environment influences a person's physical appearance and how intelligent he/she will become is the rubber-band hypothesis. The rubber-band theory states that genetics provides a person with potential for intelligence, height, strength and so on. Consider this potential to be in the form of a rubber-band. Each person is born with a different sized rubber-band (bigger if they have lots of potential and smaller if they have less potential). Depending on the environment these bands can be stretched to full length or they can remain the same size. Of course, the larger the band, the further it can be stretched, but a small stretched band can be longer than a large un-stretched band.

For example, say two boys, Fred and Jim, are born at the same time. Fred is born with a large rubber-band of potential, and Jim is born with a smaller rubber-band of potential. Now, say that Fred's parents are neglectful and don't feed him very nutritious food. They don't encourage his studying and school work. Instead of signing him up for sports, they let him stay in all day and play video games. Jim's parents, on the other hand, feed him very nutritious foods. They help him with his homework and encourage him to have an active life. Although Fred was born with the larger rubber-band, his environment is not stretching his band. If Fred has the potential to grow to 6'4" when his band is completely stretched but only 5'10" if his band isn't stretched, because of his poor nutrition and unhealthy life he will not grow to 6'4" but only to his "un-stretched" height of 5'10".

Now, if Jim has the potential to grow to 6'2" if his band is fully stretched but only 5'6" if his band is un-stretched, because of his healthy life and good nutrition Jim will grow taller than Fred and reach a height of 6'2". If people have a healthy environment, it is more likely their rubber-bands will be stretched and they will reach their full potential. In the example above, Fred's environment was not beneficial and did not stretch his rubber-band. But Jim's environment was optimal and he reached his full potential.

The Notion of a Pure Environmental Influence



Psychologists who believe in a pure environmental influence on behaviour and physicality believe that the environment is solely responsible for how we look and how we act. This is, of course, the exact opposite of a pure genetic influence. For example, if Garry likes chocolate ice-cream, reading, skating, the colour blue, and is described as being a caring person, he is so because he has learned to like those things and be that way. As he has grown, his environment has influenced him to like the things he does and behave the way he does.

Locke's *tabula rasa*

John Locke, an English philosopher who lived during the seventeenth and eighteenth centuries, came up with the concept *tabula rasa* (translated from Latin to mean blank slate). The tabula rasa theory was based on Locke's boast that he could take any child and turn him/her into anything he desired. He believed every child was born a blank slate, with equal potential and abilities. Who and what that child became was determined entirely by the experiences and training he/she received. Locke believed he could turn any child into a respected individual or a thief, depending on what he exposed him/her to. In this sense, Locke was completely convinced of an entirely nurture-related influence on human behaviour and personality.

Little Albert and the White Rat – An Example of Conditioning

In 1920 John B. Watson conducted an interesting experiment with a little boy named Albert, a white rat, and a loud noise. Albert was a little boy who had no fear of most things in his environment. Watson wanted to find out if fears were learnable instead of being instinctive as was traditionally thought. Albert was allowed to play with a variety of objects and animals (the white rat, a dog, wool, etc…) and he had no fear or adverse reactions to any of them. Watson then hit a steel bar whenever Albert would reach out to pet the rat. This startled Albert who began to cry (loud noises are often associated with danger). From then on the loud noise was paired with the white rat and Albert always had a strong negative response. Eventually, the white rat was able to elicit a negative response from Albert even without the loud noise.

Watson then introduced other objects. Albert did not cry when blocks or rubber balls were placed in front of him but Albert did cry when he saw a white rabbit. In fact, Albert generalized his fear to many white furry objects including white fur coats, cotton wool, and even a Santa Claus beard.

In a way the experiment was a success because Watson had successfully demonstrated that fears could be conditioned or learned. On the day Watson was to attempt to "undo" the learned fear of white furry objects, Albert was taken from the hospital. We know now that conditioning principles can be used to remove conditioned fears but we do not know what became of poor Albert.

Watson and Baby Albert

The stories of John Watson and his incredibly unethical experiments with baby Albert are infamous in the world of psychology. Watson conducted his experiments during the earlier part of the twentieth century when no ethical safeguards were in place to protect test subjects from questionable research. Watson was interested in the creation of phobias. Watson was a behaviourist who believed that people could learn to be afraid of certain things and he set out to prove his theory by making a baby afraid of furry white animals.

Watson chose baby Albert as a test subject because the eight-month-old child was described as being "fearless." Watson started his experiment by exposing Albert to a white rat and then, behind the baby's back, loudly banging a steel bar. After many trials of being simultaneously exposed to both the rat and the disturbing noise, Albert began to shake and cry as soon as he saw the rat. Soon Albert became anxious and upset whenever he encountered anything furry or white (human hair, dogs, rabbits and even a Santa Claus mask). Watson had proved, without a doubt, that fear was not a trait humans were born with but something they learned from their environment — a strong argument for the nurture argument.

Watson failed to start his experiments to reduce baby Albert's learned fears. Albert was removed from Watson's care and neither Watson, nor any of his colleagues, ever attempted to find Albert and reverse the damage they had done. Albert's fate is still unknown today. Whether Albert grew up to be a mentally healthy man or whether he lived his life afraid of all animals and the colour white is unknown.

Contemporary studies on the correlation between environment and behaviour are being carried out. One area of study that is of great importance to parents and educators is why some children (and adults) become bullies. Extensive studies have been done to determine what exactly causes a child to become a bully. Most studies have decidedly favoured environmental factors as being major determinants of whether or not a child will bully others. Researchers have found that parents who don't show their children much attention or warmth are more likely to raise children who will become bullies. Other factors include modelling of aggressive behaviour in the home and lack of supervision. Other studies indicate that children who watch a male figure act aggressively toward a female figure in the home, are more likely to be aggressive themselves (Loeber & Stouthamer-Loeber, 1986; Patterson, DeBaryshe & Ramsey, 1989; and Olweus, 1993).

Finding a Middle Ground Between Nature and Nurture

The Interactionist View

Interactionists believe that both genetics and the environment shape the kind of person we become, as well as our likes and dislikes. The rubber-band hypothesis is based on an interactionist view. Interactionists believe that genetics contribute some parts of our physical and behavioural make-up but that the environment also contributes to our unique personalities.

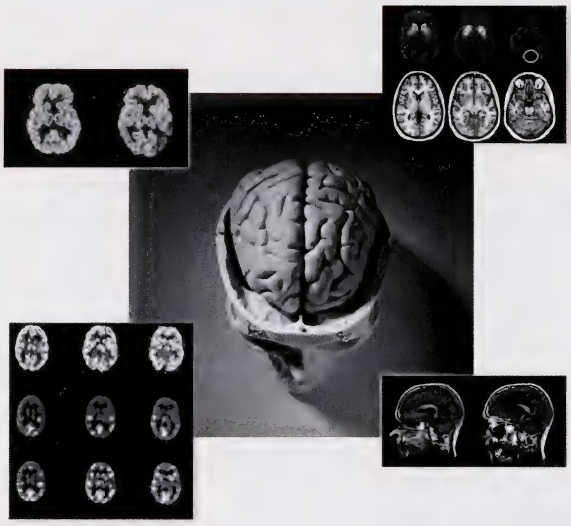
Contemporary Studies on the Interaction Between Heredity and Environment on Behaviour

An area of great interest to psychologists is alcoholism. Initially, we believed that a person's environment was responsible for alcoholism (such as a disturbing childhood or other unbearable events that would cause a person to drink). Now, we have also found several genetic correlations to alcoholism. Genetic studies have found the correlation that close relatives of an alcoholic are four times more likely to become alcoholics themselves. This also holds true for children who were adopted away from their biological families at birth and raised in a non-alcoholic adoptive family.

Twin studies have also confirmed both genetic and environmental influences for alcoholism. (Remember that a twin study involves comparing identical twins who were raised apart.) Researchers have been found that if one twin has a problem with alcoholism then there is a higher chance the other twin will as well. Although these studies show a strong correlation, an even stronger correlation has been found between parents who are alcoholics having children who are alcoholics (whether adopted or not). This means there is a genetic correlation for alcoholism as well as several environmental ones.

Today, most psychological studies that try to determine various causes of behaviour try to take into account both genetic and environmental factors. As you have learned in this chapter, it is quite hard to determine a sole cause for any type of behaviour. Genetics and the environment constantly appear to interact to create unique individuality in humans.

Turn to Assignment Booklet 5 and complete the assignments for Section 3, Lesson 1.



The Brain

hemispheres – *pertaining to the right and left side of the brain*

corpus callosum – *a thick bundle of specialized neurons that allow each hemisphere of the brain to communicate*

neurons – *specialized nerve cells, in the nervous system, that are designed to communicate with other cells very quickly*

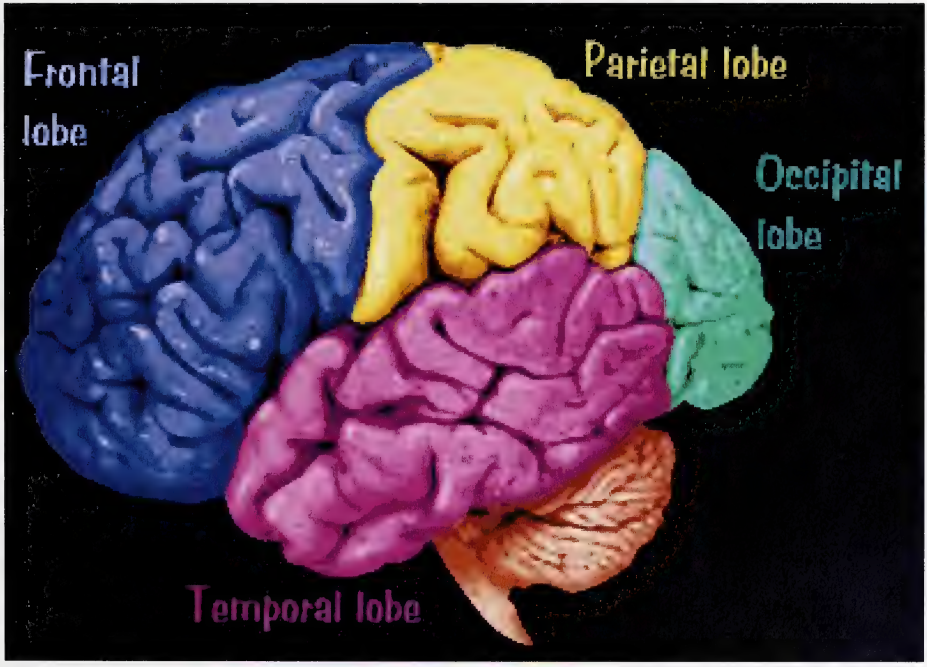
The human brain can be considered as the body's control centre. Everything we feel, see, hear and think comes from complex processes in the brain. The brain regulates all the critically important functions of the body such as breathing, sleeping and blood circulation. As well as keeping the human body alive, the brain also controls our emotions by releasing chemicals in the brain, called neurotransmitters, and hormones in the body.

Lobes of the Brain and their Corresponding Domains

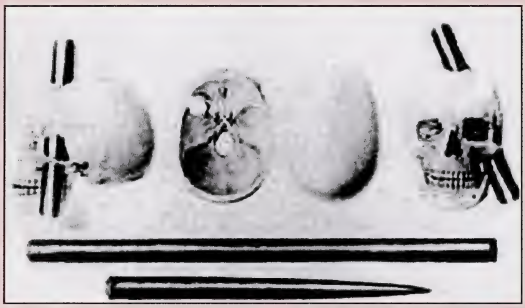
The brain is divided into two **hemispheres** (the right and left) with four lobes on each hemisphere (the frontal lobe, the occipital lobe, the parietal lobe and the temporal lobe). The hemispheres each represent a side of the brain, just as you have a left side of your body and a right side of your body, so too, you also have a right and left side of your brain. The hemispheres are connected to each other by the **corpus callosum**, a thick bundle of specialized **neurons** (specialized nerve cells, in the nervous system, that are designed to communicate with other cells very quickly) that allow each hemisphere to communicate to the other. What is unusual about the brain's two hemispheres is that the right hemisphere controls the left side of the body and the left hemisphere controls the right side of the body.

Each of the four lobes is a specified section on the surface of the brain that controls certain body functions. The frontal lobe is mainly responsible for motor control (movement) and personality. The occipital lobe contains an area responsible for vision. The parietal lobe is responsible for the body's ability to sense touch, pressure, temperature and vibration. Lastly, the temporal lobe is responsible for hearing.

Scientists know what body functions the different lobes control because, when they stimulate a living brain of a human, that person experiences movement or hearing or visual images or skin sensations, depending on which lobe area is stimulated. Also, when people experience severe brain injuries they tend to have problems corresponding to the function of the lobe that is damaged. For example, a person who receives a severe injury to the occipital lobe may end up completely blind, even though the eyes remain perfectly healthy.



The Case of Phineas Gage's Brain Injury



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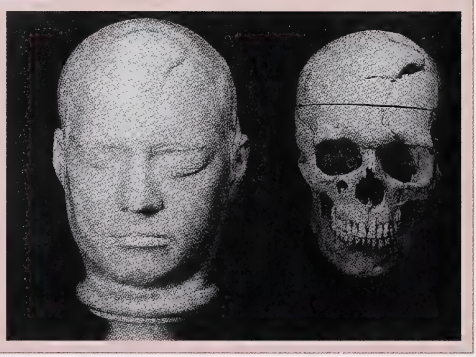
The tamping iron was 3 feet 7 inches long and weighed 13 1/2 pounds. It was 1 1/4 inches in diameter at one end and tapered over a distance of about 1-foot to a diameter of 1/4 inch at the other.



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The case of Phineas Gage is a well-known psychological case study that documented the effects of a severe brain injury to a man's frontal lobe. Gage was a 25-year-old railroad worker in 1848 when an explosion blew a 13-pound iron rod into his frontal lobe. Miraculously, Gage survived; his only physical effects being blindness in one eye and partial paralysis of one side of his face. Before the accident, Gage was described as an intelligent, energetic man, whose behaviour was always considered normal. But after the accident, Gage's family started noticing changes in Gage. He would have fits of swearing and increased aggression to others. One day, he would be determined to do something and the next he would change his mind. Gage's family reported that he acted like a completely different person.

Cases of frontal lobe damage causing personality changes are well documented throughout psychological literature. Frontal lobotomies (where surgeons purposely severed one part of the brain from the rest of the brain) were quite commonplace in the past century, as a way of changing people's behaviour. Lobotomies were most often performed on mental patients whose behaviour was hard for others to control. After the lobotomy a once active person would become very quiet and still-often to the point of being almost comatose. Today, lobotomies are rarely used as a method of controlling behaviour or to treat people with mental problems.

The Autonomic Nervous System

Certainly there are body processes of which we are unaware and over which we have no conscious control. Our bodies manage to live without us consciously telling our lungs to breathe in air and our heart to pump. We don't tell our bodies to go to sleep and we don't tell our bodies to wake up. Yet these are all life-giving processes that occur in our bodies without us even being aware of their taking place. These life-sustaining processes, beyond our conscious control, are regulated by the **autonomic nervous system**.

The autonomic nervous system can be split into two divisions: the sympathetic division and the parasympathetic division. The **sympathetic division** deals with responding to emergency or crisis situations, for example, coming face to face with a gigantic, snarling dog, your sympathetic division will prepare your body for dealing with the situation. You will immediately become more alert, blood will flow to your muscles and your heart rate will increase. These immediate responses prepare your body to flee the scene or to fight off the dog, if it attacks.

The **parasympathetic division** regulates normal body functioning. When your dangerous confrontation with the dog is over, your parasympathetic division kicks in and returns your breathing, heart rate and other bodily functions back to normal. Basically, the parasympathetic division takes care of all the non-emergency functioning required of the body, such as waste elimination, conservation of body energy, and so forth.

autonomic nervous system – *the nervous system that controls the life-sustaining processes (breathing, sleeping, beating of the heart) not under our conscious control*

sympathetic division – *the part of the autonomic nervous system that deals with responding to emergency or crisis situations*

parasympathetic division – *the part of the autonomic nervous system that regulates normal body functioning*

reaction time – *the time between a stimulus and its effect*

Helmholtz's Use of Reaction Time to Study Nerve Energy

By the end of the 19th century, scientists were aware that the brain sent impulses through the body along nerves. They were aware that the brain was the body's main control centre and that the brain relayed its commands to muscles via networks of nerves. Little was known about the time it took for a command to work its way from the brain to the muscle. Most scientists of the time believed that as soon as the brain thought of an action, that action was immediately carried out. Hermann von Helmholtz devised a simple experiment to test this theory out. He stimulated different points on a frog's nerve and timed how long it took from the stimulation time to the time when the muscle contracted. Helmholtz discovered that the closer the stimulated area of the nerve was to the muscle when stimulation occurred, the faster the muscle contracted. This was one of the major breakthroughs in the study of nerve energy. Helmholtz's work revealed that nerve impulses took time to travel from the site of stimulation to the site of muscle contraction. Furthermore, his studies indicated that the greater the distance the electrical impulse has to travel, the more time elapses before the nerve impulse shows its effect. Helmholtz's study is considered important because he paved the way for researchers to use **reaction times** (the time between stimulation and its effect) to measure mental processes.

Neurotransmitters

synapses – the small gaps between neurons where neurotransmitters are released

neurotransmitters – the chemicals released by neurons

Cells that transmit messages in the brain and certain parts of the nervous system are called neurons. These cells are specialized in theirs shape and positions. The neurons do not touch each other. Small gaps, called **synapses**, lie between neurons. In order to get a message across to another synapse, neurons release tiny bits of chemicals called **neurotransmitters**. So, an electrical impulse will travel through a neuron (just as in other nervous system cells) but when it reaches the end of a neuron, instead of the electrical impulse travelling in to the next cell, it releases neurotransmitters. These neurotransmitters then travel into the synapse between the two neurons, seeking a specialized area where they can fit onto the next neuron. We have many types of neurotransmitters and they are all are shaped differently from each other; in order to have an effect on another neuron, the neurotransmitter must fit into a site specifically designed for them. To visualize this process, think of the way that your house key can open only the door to your own house.

Different neurotransmitters have different effects in the body, but all neurotransmitters must be working properly for a person to be able to sleep, move and even maintain a positive outlook on life. Following are some of the over 30 neurotransmitters found in the human body.

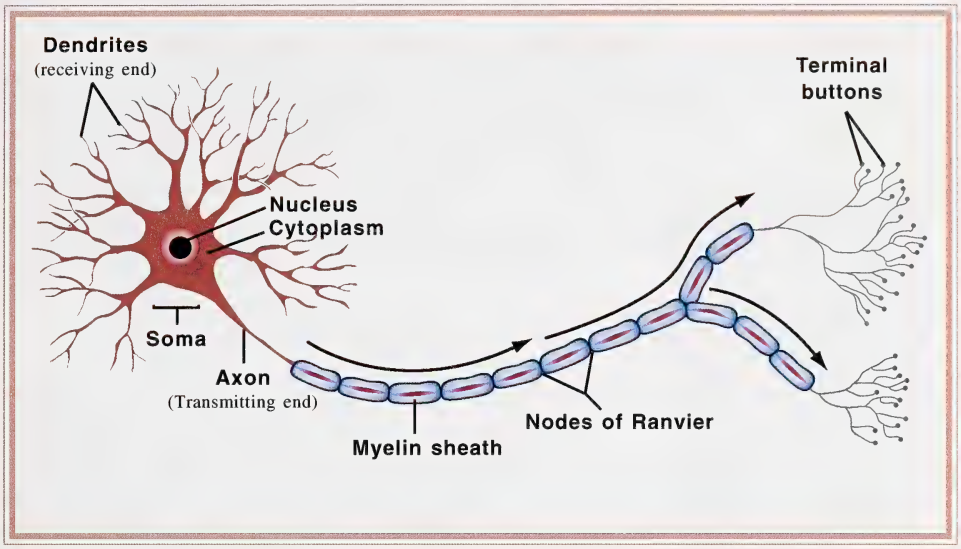
- Acetylcholine – functions in the parasympathetic division and helps to return increased heart rate back to normal.

- Dopamine – found in areas of the brain that manage movement, emotional arousal, learning and memory.

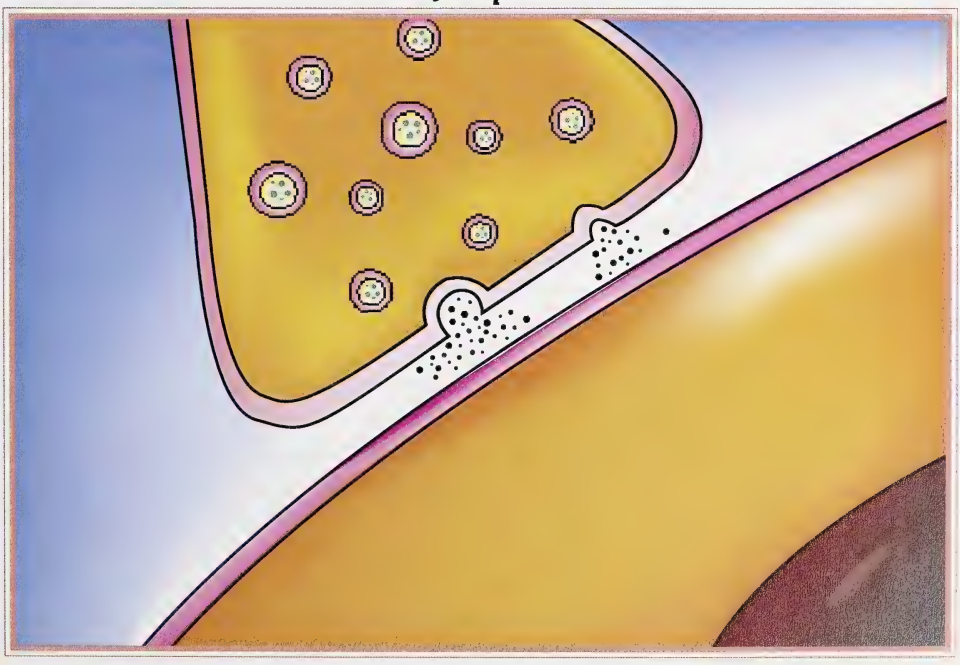
- Epinephrine – (both a hormone and a neurotransmitter) increases heart rate and blood pressure.

- Serotonin – produced in the central nervous system, and has a role in sleep and emotional arousal. Lack of serotonin production or availability in the synapses is thought to be responsible for causing severe depression in some individuals. People suffering from depression find it hard to experience any uplifting emotions or happiness. They may also have a very hard time sleeping. Antidepressants, pills which are chemically designed to make sure serotonin stays in the synapse long enough to attach to another neuron and have its proper effect, have been used with great success in alleviating severe depression.

Neuron



Synapse



Neurological Disorders

Disorders that affect the brain or the nervous system can be some of our most frightening disorders. Sometimes people find themselves losing control of their body-as in Parkinson's disease. Or, sometimes people even lose their memories and vital parts of their personalities, as happens to people stricken with Alzheimer's disease. Although medical scientists know much about what physically happens to the brain because of these diseases, they know little about what triggers the diseases and even less about how to stop the process once it starts.

Epilepsy

Epilepsy is a neurological disorder that occurs when abnormal electrical impulses occur in the brain. The impulses may involve the body seizing up or convulsing; most such seizures are followed by a loss of consciousness. These attacks occur very randomly with minutes, days or years, even, going by between one attack and the next. Doctors believe that one epileptic seizure may be caused by a high fever or by infection, but others seem to occur randomly with no specific detectable cause.

Epilepsy has a genetic link because it appears more likely to run in families. Treatments may involve medication that prevents convulsions. In more severe circumstances, brain surgery may be presented as an option. If the aberrant impulses are specific to certain areas of the brain, the brain surgery may involve cutting certain neural connections, thereby preventing the abnormal electrical impulses from affecting areas they shouldn't.

Parkinson's Disease

Parkinson's disease occurs when a specific part of the brain starts to degenerate. This section, called the Substantia Nigra, contains cells that release the neurotransmitter dopamine that is thought to have some role in controlling movement. The symptoms of Parkinson's disease include shaking, muscle rigidity while at rest, involuntary movements, inability to maintain a body position, difficulty moving and problems producing speech.

The main challenge that researchers face in developing a cure for Parkinson's is finding some way to stop the degeneration of the Substantia Nigra. Until a cure for the degeneration can be discovered, doctors must treat this disease with medication that enables the body to keep dopamine in its system.

Alzheimer's Disease

Alzheimer's disease is characterized by a loss of memory and cognitive functioning. Alzheimer's usually occurs in people typically 65 years and older. Symptoms appear slowly but once the symptoms start they progressively get worse. Alzheimer's has a strong genetic factor and can be linked to a certain gene in the body.

The symptoms of Alzheimer's are thought to be caused by three different factors:

1. The tangling of neurons in the brain which may cause the confusion that sufferers of Alzheimer's experience.
2. Nerve ending deterioration that would also interfere with transmitting impulses throughout the body.
3. Small holes in the bodies of cells located in the area of the brain responsible for memory.

Although science has these conditions under close research, we have had no real breakthrough in preventing or reducing the symptoms of Alzheimer's.

Multiple Sclerosis

Multiple Sclerosis is caused by a degeneration of myelin, the protective covering of neurons in the brain. Symptoms include weakness, loss of body control, blindness, epilepsy and the deterioration of muscle. Symptoms occur in early adulthood and the sufferer may go through periods in which the symptoms lessen or disappear altogether, although they always return. There is no cure for Multiple Sclerosis, although some prescribed medication appear to help control the symptoms.

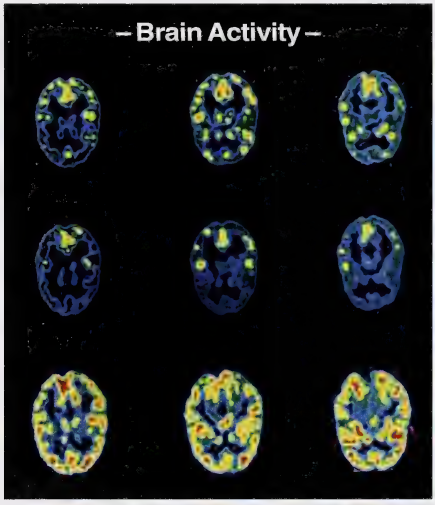
EEGs, PET Scans and MRIs

Because the brain contains our essence as humans, being able to monitor the brain's activity without having to open the skull and risk damage is of incredible importance. If a patient has a brain tumour surgeons cannot just randomly cut out sections of the brain until they find it. They must be able to pinpoint its exact location, size and the areas of the brain it is invading. Because of the delicate nature of the brain and its billions of neural connections, specialized machines must be used to monitor the brain without putting the patient's well-being at risk. Following are three of the most important machines used to look at the brain and its functioning.

Electroencephalograms (EEGs)

The brain is constantly generating electrical activity. This is how information travels from one neuron to the next. The electrical activity results in brain wave patterns that can indicate whether a person is alert and awake, sleeping or dreaming. Brain waves change depending upon the type of thinking a person is doing. Brain waves are constantly changing as a person thinks or changes environments, especially during when a person is confused or surprised. If a malfunction occurs in any of the neurons in the brain, it may be detected by tracing unusual brain wave activity. Brain wave activity can be monitored by an electroencephalogram (EEG) that records the activity. Doctors simply place receptors on the skull. The receptors resemble suction cups and cause no pain. The receptors relay the information onto a computer screen, to be read by a doctor, enabling the monitoring of brain wave functions.

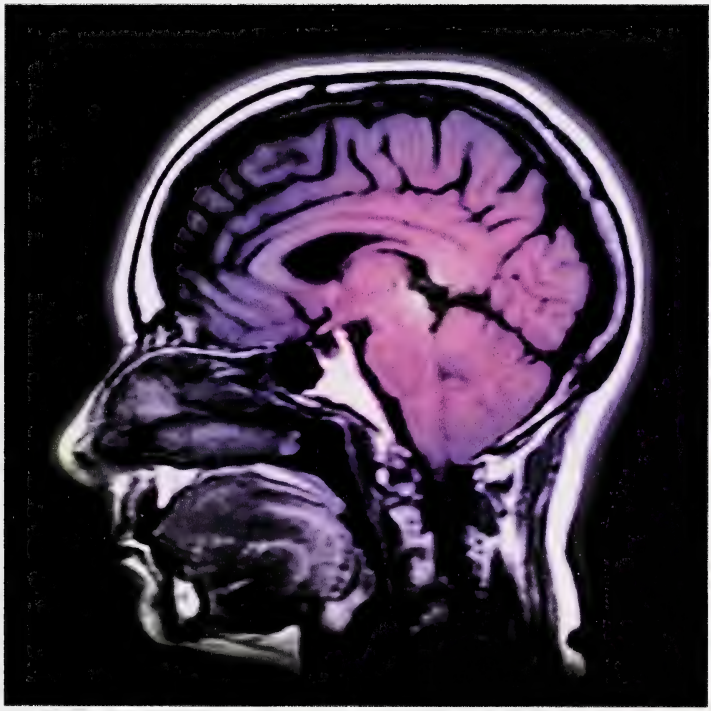
Positron Emission Tomography (PET Scans)



Positron Emission Tomography (PET scans) is a method by which doctors can look at which areas of the brain are active at any given time. An active area of the brain requires glucose to function (which it gets from the blood supply). By injecting a radioactive solution that binds to glucose in the bloodstream, active areas in the brain that require glucose will give off temporary radioactivity. Machines that are sensitive to radioactivity then photograph this radioactivity. The resulting photographs give a clear picture of active areas of the brain during any task or circumstance. Brain tumours, for example, would show an area of inactivity where activity is usually present.

Magnetic Resonance Imaging (MRIs)

Magnetic Resonance Imaging (MRIs) use magnetic pulses to show researchers the health of cells in the human body. MRIs are so sophisticated that the images related back to the computers can tell researchers whether cells in a certain area are full of water or are processing oxygen efficiently. MRIs are not only used to get an image of the brain but they can also be used to monitor any soft tissue in the human body.



The Endocrine System

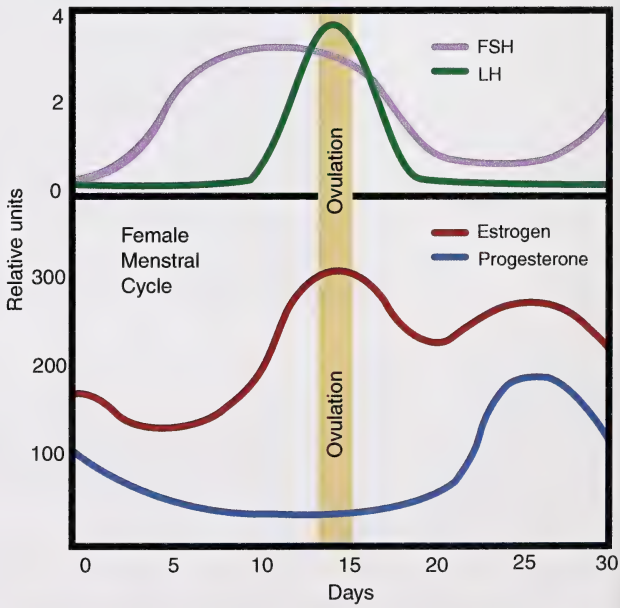
The endocrine system consists of glands that produce and release hormones into the body. Hormones are chemical substances that can affect body development and behaviour. Hormones have been targeted as being responsible for controlling body temperature, controlling feeding behaviour, determining which sex organs a child will develop, triggering puberty, regulating growth, and affecting the moods of both men and women.

Hormones and Maternal Behaviour

Hormones tend to play a large role in maternal behaviour. In humans, and many other animal species, babies are born dependent and fragile, unable to look after themselves. This helplessness makes it very important that the mother feel the need to care for her babies. (It is not disputed that the father is also a very important care-giver in a baby's life, but male care-giving is generally more specific to primates and does not always occur in other animals. This discussion, therefore, will focus on maternal behaviour because it has been the parental behaviour most studied).

The hormone progesterone has been found to be especially important in regulating nest building instincts in some animals. Progesterone exists in the body in increased amounts during pregnancy, especially just prior to giving birth, the time during which animals build nests. Another hormone called prolactin, which stimulates milk production in mammals, is responsible for the behaviour that involves taking care of nests after the babies are born. Scientists know that these hormones are responsible for nest building behaviour because when these hormones are given to non-pregnant animals, nest-building and caring behaviours appear.

The level of another hormone, estradiol, increases after a female gives birth and is also considered very important for regulating care of babies after birth. This care would involve the desire to feed and protect babies. Non-pregnant rats given estradiol show nurturing behaviour to baby rats, whether the babies are related or not. Most experiments regarding hormonal control of maternal behaviour have been conducted on rodents. The few studies that have been done on primate (monkeys) maternal behaviours tend to show that the monkeys' previous experience with babies is more likely to predict maternal behaviour than are hormone levels. Female monkeys who have previously raised babies are more likely to look after them than inexperienced females. This suggests that although hormones play a role in maternal behaviour, experience with babies also tends to evoke maternal behaviour.



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Hormones and Sexual Behaviour

Hormones are responsible for determining the development of sex organs in a baby as well as determining a child's onset of puberty. Hormones are also responsible for initiating sexual behaviours in adults.

We have long been known that the hormone testosterone is responsible for male sexual desire in humans and animals. If an animal is castrated (its testicles are removed), and its production of testosterone, therefore, is severely diminished, the animal will become unwilling to engage in sexual behaviour. An inability for human males to produce normal levels of testosterone also results in a lack of sexual desire. In both humans and animals injections of testosterone can often restore normal sexual functioning.

Some evidence also indicates that hormones affect human females' sexual desire. During ovulation (the time when females are most likely to become pregnant) levels of estradiol and leutenizing hormone are extremely high. During this time many women have reported feeling more sexually receptive and willing to engage in sexual intercourse. Female rodents display sexual behaviour that encourages mounting behaviours from other males when their estradiol and leutenizing hormone levels are high. In evolutionary terms this makes a lot of sense. If survival of the fittest involves having as many offspring to pass your genes as possible, organisms should become sexually receptive when they are most fertile.

Hormones and Aggressive Behaviour

The hormone testosterone has also been linked to aggression in both males and females. Higher levels of testosterone, in both humans and animals, results in higher levels of aggression. Not coincidental, higher levels of testosterone also results in increased sexual desire in males. Animals in the wild often have to compete for the best mates, usually by fighting. A male that is ready to mate would also benefit from becoming more aggressive, in case he has to fight off other males for his chance to reproduce. In the animal kingdom, aggression and sexual behaviour often go hand in hand. What is interesting about this reproductive aggression is that is geared only toward other males. Rarely, in the animal kingdom, does a male attack a female.

In humans, men appear to be far more aggressive than females. We can account for this disparity, in part, by a man's higher levels of testosterone. Our society, however, recognized male aggression as more socially acceptable and female aggression as less socially acceptable. Men may also be more aggressive than females because they have learned that it is socially acceptable to be so. This would be an effect of stereotyping, as you have learned earlier in the course.

Sleep

Everyone knows that a body needs sleep if it is to function at its best. Lack of sleep results in slower mental processing, thinking, and slower reaction times. We require sleep for our brain and neurotransmitters to replenish themselves after being depleted when the body is awake. Yet, although sleep is something every human does, we know very little about what occurs when a person is sleeping. Scientists have been able to study the physiological changes that take place during sleep but how dreams function, for example remain a mystery.

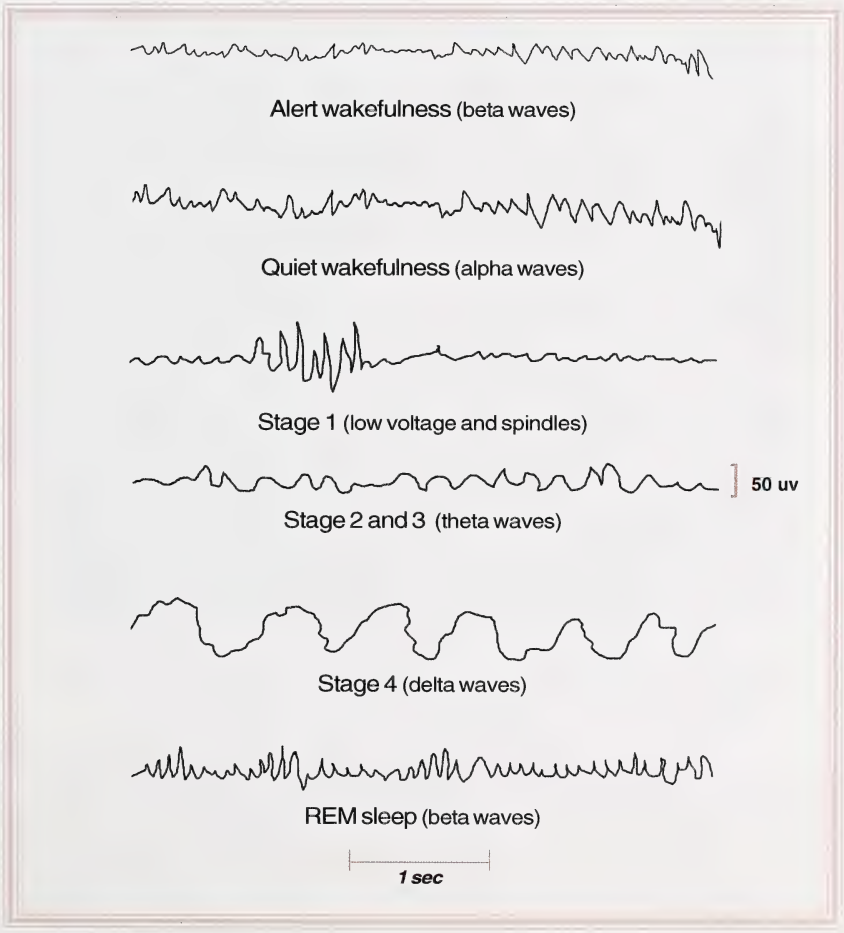
Physiological Changes During Sleep

The electrical impulses that the brain produces can be measured by EEGs (electroencephalograms). The electrical activity measured by an EEG is characterized as brain wave activity. Brain waves differ depending on whether a person is awake or asleep; in fact, brain waves even differ during different phases of sleep. The human body goes through five different stages during sleep: stages one, two, three, four and REM (rapid eye movement) sleep. The body repeats this cycle during sleeping, going through the various stages until the person wakes up. An adult generally spends 50 percent of sleep time in stage two, 20 percent in REM sleep and 30 percent in the other stages. The stages can be characterized as follows:

- ***Stage one:*** also characterized as light sleep this is the stage where a person drifts in and out of sleep and can be awakened quite easily. Eye movement slows down and muscles start to relax. Some people awakened during this stage can recall seeing some images. Many also experience sudden muscle contractions accompanied by the feeling that they are falling. Their bodies start or make a jump, waking the person up.
- ***Stage two:*** during this stage our eye movements stop and our brain waves show a pattern that is much slower than when we are awake. Occasionally a rapid, fast burst of brainwave activity will occur for a brief period of time.
- ***Stage three:*** (also referred to as deep sleep) during this stage our brain waves become even slower and a pattern of delta waves occur with the occasional burst of smaller, faster waves. During this stage people are very difficult to wake up. When they are awakened, the feel disoriented and groggy. They show no eye movement or muscle activity. This is the stage when people experience night terrors, bed-wetting and sleep walking.
- ***Stage four:*** also referred to as deep sleep. During this stage the brain produces delta waves almost exclusively. All the effects that occur during stage three occur during this stage as well; the only difference is the absence of the fast bursts of waves.

- ***REM sleep:*** during this stage our body functions speed up. Our breathing becomes more rapid, irregular, and shallow, and our eyes move around rapidly in all directions. Our arm and leg muscles become paralyzed, and our heart rate increases, and our blood pressure rises. This is the stage where dreaming occurs. The amount of time a person spends in REM sleep depends on the person's age. A baby spends 50% of its sleep time in REM sleep, a young adult spends 20% of sleep time in REM sleep and an elderly person spends 15% of sleep time in REM sleep.

Psychologists believe that REM sleep to be extremely important for developing pathways between a baby's nerves and muscles, and important in storing memories and new experiences in the neural networks of the brain. Because of its extreme importance in body functions, if a person does not sleep well or misses a night's sleep, the body will automatically increase the duration of REM sleep when the body next falls asleep.



How much sleep does a person need?

The amount of sleep a healthy person needs mainly depends on their age and sex. Babies require about 16 hours a day, teenagers need about 9 hours, and adults usually require 7 to 8 hours of sleep a night — although some adults may require as few as 5 hours or as many as 10 hours of sleep each day. Recent studies have shown that women, on average, require one to two more hours of sleep a night than men do (this may also increase during a woman's menstrual cycle).

So how do people know when they are getting enough sleep? The body gives its owner many clues as to whether or not it has had enough sleep. The following are some of the signs your body may give you to signal that it needs more sleep:

- You wake up with the feeling that you could go back to bed
- You feel drowsy during the day — no matter how bored you are
- You fall asleep within five minutes of lying down

sleep debt – when people do not get enough sleep they build up a sleep debt that must be paid off in rest for the body to function fully

If you do not get enough sleep during the night, your body builds up a sleep debt that must eventually be paid off. Once the sleep debt becomes to high, your body will demand it be paid off. You will pay off your sleep debt by napping or sleeping much longer than usual. Lack of sleep results in impaired thinking, and slower judgment and reaction time. Studies show that during hand-eye coordination tests, sleep-deprived people perform about the same as people who are intoxicated.

Why do we need sleep?

Psychologists know that sleep is necessary for survival, especially REM sleep. Studies show that rats who were deprived of REM sleep lived for approximately five weeks only, compared to an average life span of two to three years! Test animals that were deprived of sleep were also more prone to illness. We think that our immune system becomes severely compromised when we do not get enough sleep. Some scientists also believe that sleep is necessary for neurons to repair themselves. Sleep is also necessary for children's growth and cellular growth.

Disorders of Sleep

As you have just learned, sleep is very important for people who wants to be at their best. Yet the thought of sleep might be a living nightmare for people who suffer from narcolepsy, night terrors and bedwetting.

Narcolepsy

Narcolepsy is the sudden, unpredictable, onset of sleep. It can be characterized as a sleep attack. It usually occurs when a person is bored, but can also happen at the most inappropriate times. Such attacks usually lasts about three minutes before the person wakes up feeling refreshed. Such moments often have a serious effect on social and professional life!

Another form of narcolepsy, called cataplexy, occurs under times of extreme stress and involves an entire loss of muscle control. For example, consider a man about to give a very important speech at work. The man gets up in front of all his superiors, opens his mouth to talk and all of a sudden falls asleep. All muscles go slack as he slumps to the floor, appearing to all as if he has just fainted. The man will wake up from his sleep feeling very embarrassed as all his co-workers stand over him with concerned looks on their faces.

"The Nightmare"
by Henry Fuseli, of Swiss Nationality in 1781 (Objective Date). Founders Society purchased with funds from Mr. & Mrs. Bert L. Smokler and Mr. Mrs. Lawrence A. Fleischman. Photograph ©1997. The Detroit Institute of Arts.

Narcolepsy is caused by a brain malfunction that engages the brain to go in to REM sleep at inappropriate times. People who suffer from narcolepsy start sleeping with a REM cycle; whereas, the normal sleep pattern starts with a longer, delta sleep cycle. Narcolepsy has a strong genetic component and can be controlled with drugs that effect the brain's neurotransmitters.

Night terrors, Bed-wetting and Sleep Walking

Whereas narcolepsy involves a problem associated with REM sleep, night terrors, bed-wetting and sleep walking all are associated with delta sleep. All three disorders occur most frequently in children and often correct themselves as the child grows older, although the disorders are usually distressing to people who suffer from them.

Night terrors are characterized by suddenly waking up, screaming, heart racing with a feeling of being terrified. People who suffer from night terrors have no memory of what has frightened them. Most people would think that night terrors are caused by a nightmare but this is unlikely because the terrors occur during delta sleep; the part of the sleep cycle not linked to dreaming.

Sleep walking, or somnambulism, occurs when a person engaged in delta sleep starts moving. Often, they leave the bed. The person is not acting out dreams because, as during night terrors, a person does not dream during delta sleep; people dream during REM sleep. Why a person would start moving during delta sleep has still to be explained.

Insomnia

Insomnia is the inability to fall asleep and appears to affect at least 20% of people at some time in their lives. Insomnia has many causes and many forms. Some people cannot sleep because they are worried or anxious. In this case doctors believe that when the stress that is causing the worry is dealt with, normal sleep patterns will return. Another form of insomnia, drug-dependency insomnia, occurs when a person becomes dependent on sleeping pills and is unable to go to sleep without them. Studies have found that people who takes sleeping pills for as little as only three days may have trouble falling to sleep when they stops taking the pills.

Another type of insomnia, called pseudoinsomnia, occurs when people believe that they haven't slept all night when in fact they have. This form may occur because a person is completely unaware of falling asleep, or it may occur because the person actually dreams of laying awake in bed. This insomnia has no cure because the patient actually is sleeping, whether he/she believes it or not.

Another type of insomnia is called sleep apnea. Sleep apnea occurs when a person stops breathing during sleep and immediately wakes up. If the apnea is severe the person can end up getting very little sleep at all and will wake up after a full night of sleeping and awaking (which is not always conscious) feeling very tired. Most sleep apnea is caused by a physical obstruction in the nasal cavity or throat and can be corrected with surgery.

Instincts and Species-specific Behaviours

All humans and animals have instincts or species-specific behaviours that shape their actions at certain times in their lives. These behaviours seem to be something the organism is born with, almost as if they are pre-wired into the organism's brain.

instincts – unlearned behaviour patterns that appear in the same form at a certain point in the development of every member of a species

releaser – anything that triggers an instinct

imprinting – the phenomenon of baby birds following the first thing they see moving

Instincts can be defined as unlearned behaviour patterns that appear in the same form at a certain point in the development of every member of a species (Zimbardo, 1985). Examples of instincts are salmon swimming upstream to lay their eggs, Canadian geese flying south for the winter and returning to their original homes when the weather gets warmer; and bears hibernating in winter.

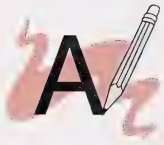
It is quite amazing to think that these animals are not taught to swim upstream, migrate or hibernate; they simply do so when the time is right. Psychologists have studied many theories on how these instincts come about, but most agree that these organisms are born with these instincts. Answers regarding how these instincts are triggered are a little more concrete. Some instincts may be triggered by environmental cues such as the weather turning cold, thereby relaying a message to the bear's brain that it is time to hibernate. Other instincts may occur when an organism reaches a certain age or level of maturity. Still other instincts may be triggered by chemical scents (also called pheromones) released by other members of the species. Anything that triggers an instinct is known as a **releaser**.

One particularly fascinating instinct, found in the behaviour of baby ducks, is called **imprinting**. A duckling is born with the instinct to follow and bond with the first thing it sees moving (its imprinting releaser). This instinct makes sense in a survival sense because the first thing a baby duck would see moving, usually, is its mother; a wise little duck would stay near its mother where it can be protected. Imprinting is clearly visible when a mother duck swims in a pond trailed by a train of all her babies. But often a baby duck will imprint on something that is not its mother, especially if the mother dies before the baby hatches. Ducks have been known to imprint on humans, dogs or any moving object they see shortly after birth. So, even though it may not be wise for the baby ducks to imprint on creatures or objects other than their mother, the instinct cannot be altered. They are born with the need to follow.

Most instincts are based on survival. One especially interesting phenomenon that occurs in animals and humans is that of taste aversion. Whether or not taste aversion is an exact instinct is debatable, but it is seen in almost every animal species on the planet. Taste aversion experiments are based on the hypothesis that animals can be learn to avoid a food that makes them sick, faster than they can learn almost anything else (in this instance the trigger of getting sick may release the instinct to learn to avoid foods that may harm a species). For example, if a dog is given a new chicken-flavoured dog food that is tainted with a mild poison that makes the dog ill, it is very likely that the dog will avoid that food the next time it is offered. This phenomenon occurs with humans as well. Consider this: you go to a restaurant and eat something you usually like. You go home and an hour later you are violently ill, throwing up and writhing on the floor with violent stomach cramps. Even though your illness may be due to a stomach flu or something you ate the day before, you will most likely blame your illness on what you just ate and on the restaurant. Most likely you will never eat at that restaurant again, or you might never eat that type of food again. Your body and your mind will make the connection that either the restaurant or the food was responsible for your being sick and, not wanting to repeat the experience, you will avoid either the food or the restaurant.

species-specific behaviours – are very much like instincts. They are unlearned behaviours that surface in certain species but are less linked to reproduction and survival.

Species-specific behaviours are very much like instincts. They are unlearned behaviours that surface in certain species but are less linked to reproduction and survival. They are odd behaviours that have been passed down through the genes of certain species. Species-specific behaviours are very interesting to psychologists because they often interfere with psychologists' ability to teach animals certain behaviours. For example, researchers have tried to teach raccoons to perform certain behaviours in order to earn coins that they can trade in for food. If the raccoons are given one coin they tend to hold on to it and are reluctant to give it up. If the raccoons are given two or more coins they refuse to give them up and instead rub the coins together and dip them in water. Considering the raccoons are very hungry and they have learned that coins can get them food, they still continue 'washing' their coins. This makes sense when you consider the species-specific behaviour that raccoons display when they wash their food. In this case, the raccoons have made the connection that coins are indirectly related to food. And what do raccoons do with their food? They wash it! So, although the raccoons know they can't eat the coins, they have learned that coins equal food and that food, according to their species-specific food washing behaviour, must be washed.



Turn to Assignment Booklet 6 and complete the assignments for Section 3, Lesson 2.

The Human Senses

Lesson 1: Perception and Sensation

As human beings we are designed to perceive and sense the world around us. We can see, hear, smell, touch and taste — and by doing so, we can feel the physical world. We translate these physical feelings into sensations such as pleasure, pain, happiness and sadness. The terms perception and sensation seem linked and almost indistinguishable but the terms have distinct and separate meanings. **Perception** always refers to objects or conditions external to us; **sensation** refers to our internal experiences with these objects or conditions. For example, we may look at the road and see, or perceive, that it is icy because it appears glassy. We have seen icy roads before and know what they look like. We only sense that the road is icy when we slip on it. So, perceptions can be said to be based on previous experiences; but, learning and sensations must be personally experienced. Previously you may have slipped and fallen on an icy road so you know what an icy road may look like — you are able to perceive it. Likewise, the first time you fell on an icy road, your body went through the sensations of slipping and falling. So, perception is how you classify objects, conditions and people around you, sensations are your internal reactions to these same objects, conditions and people.

perception *– how we experience the world around us. Perception always refers to objects external to ourselves.*

sensation *– how we experience the world around us. Sensation refers to our internal experiences with objects.*

The Five Senses

Humans are considered to have five separate physical senses through which they experience the world: sight, hearing, touch, taste and smell. Each sense can tell us something about the world around us. You may see the ice crystals reflecting on the icy road. You may hear car tires sliding across the icy surface. You may touch the frozen ground and feel the frozen surface of the road. You may smell the crisp, fresh winter air as soon as you step out your front door, and if you want, you may taste the snowflakes as they drift down. All your senses provide valuable clues about the environment that surrounds you.

Some people also argue that we have more than these five simple senses, that some of us also have extra sensory perception (ESP). ESP refers to a person's ability to sense things through means other than the five commonly understood senses. This ESP could involve having visions of events that will happen in the future, called precognition, or of things that may have happened in some distant past. ESP may also include things like being able to talk to the dead or see ghosts. No real solid evidence has been gathered to conclusively prove the existence of these extra senses; but, none the less, many people believe in the existence of ESP (as you have previously learned in the section on parapsychology).

cornea – the transparent covering at the front of the eye

pupil – the dark centre of your eye, surrounded by the coloured part

iris – the coloured part of your eye that controls the size of your pupil by making it smaller when the light is bright and larger when the light is dim. The iris adjusts to the amount of light so a person can get the clearest picture available.

The Visual System

In humans and animals vision is considered the most important sense for survival. Animals in the wild must be able to see their prey in order to eat, and they must also be able to see their predators in order to escape and live to see another day. Of course, humans, being at the top of the food chain, don't have to worry about being eaten on a trip to a supermarket, so visually impaired people are able to live excellent lives. Great advances in science have also aided humans in dealing with poor eyesight. Corneal surgery, contacts and glasses help people without perfect vision cope. Animals, on the other hand, don't have it so good. An animal in the wild without perfect eyesight will not survive for long.

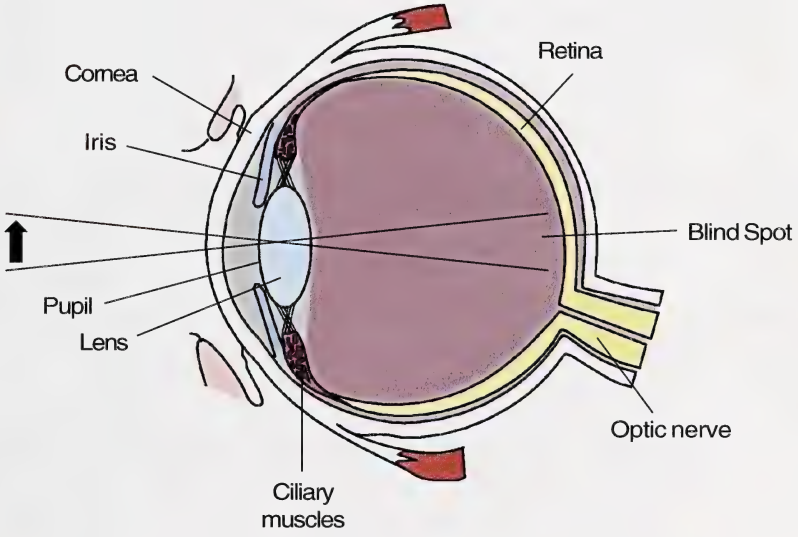
Anatomy of the Human Eye

An eye is designed to detect levels of light; that is why we can see well in bright light, but also in the dark, although not as well. Light rays first enter the eye through the **cornea** (the transparent covering at the front of the eye). Then it travels through the **pupil** (the dark centre of your eye, which is actually a hole into the back of the eye, surrounded by the coloured part. The coloured part of your eye is the **iris** and it controls the size of your pupil by making it smaller when the light is bright and larger when the

light is dim. The iris adjusts to the amount and intensity of light to allow a person the clearest picture available. You can see how the iris works by looking into a mirror and shining a light near your eye; you will notice that the pupil will contract, becoming quite small. When you remove the light, the pupil will get bigger). After traveling through the pupil, the light travels through the **lens**, located right behind the iris. The lens is responsible for focusing the images we see. The lens of a younger person is more flexible and can focus more easily. As a person ages the lens becomes more rigid and less able to focus; that is why people who have had perfect eyesight may need glass to read, or to see in the distance, when they are older. The light then travels through a jelly-like substance, called vitreous humour, that fills the eye. Finally the light reaches the back of the eyeball where it hits the **retina**, a complex layer of cells along the back wall of the eye.

lens – located right behind the iris, the lens is responsible for focusing the images we see

retina – a complex layer of cells along the back wall of the eye



Once the light reaches the retina it must go through several processes in order to transfer these light rays into images that can be seen and correctly interpreted by the brain. In the retina are three layers of cells: the first, through which the light passes, is composed of **photoreceptor cells**. These are followed by bipolar cells and then ganglion cells.

photoreceptors – specialized cells responsible for changing light signals into neural signals that can be read by the brain. They are found in the retina.

rods – *photoreceptors located around the edge of the retina. They are responsible for dealing with dim light.*

cones – *photoreceptors that are concentrated mainly in the centre of the retina. They deal with colours.*

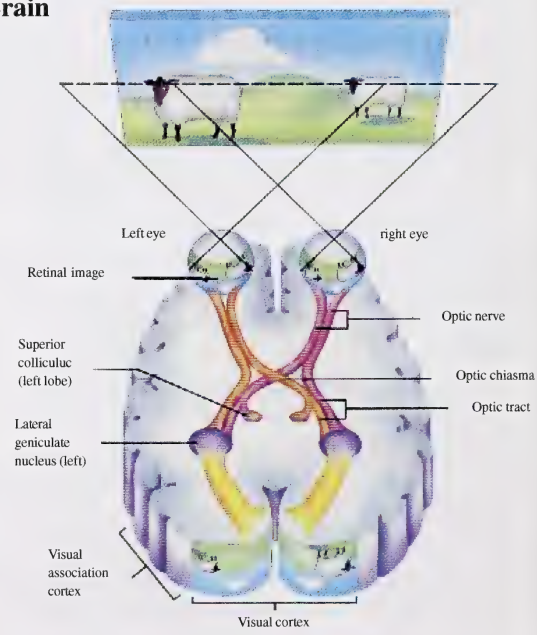
optic nerve – *all the tails of the ganglion cells are bundled to make the optic nerve*

blind spot – *the spot in a person's general area of vision, where there is no sight*

The photoreceptors are responsible for changing light signals into neural signals that can be read by the brain. There are two types of photoreceptors: rods and cones. Rods are located around the edge of the retina and are responsible for dealing with dim light. The cones are concentrated mainly in the centre of the retina and they deal with colours. The bipolar cells collect the information from the photoreceptors and pass it on to the ganglion cells. The tails of the ganglion cells combine to make up the optic nerve, the eye's link to the brain. The optic nerve leaves the eyeball through a tiny hole where there is no retina, and therefore no vision. This tiny hole is called an optic disk (technically, the *fovea*) and is responsible for the blind spot in humans. A person rarely notices this tiny blind spot because the other eye fills in the blind area. (Try this small experiment to discover your blind spot. On a blank piece of white paper draw and fill in a circle the size of a quarter. Five centimetres to the left of the circle draw an X the size of a dime. Now hold the paper with both hands, an arms length away from your face. Close your right eye and stare at the circle with your left eye. Slowly bring the paper towards your face. At one point you will no longer see the X because its image is entered on your blind spot. Notice how the area with the X is now filled with white even though the white space shouldn't be there, the X should? This is your brain realizing something should be there so it makes you think you are seeing white space.) The optic nerve then leads to areas of the brain that deal with vision, like the visual cortex located at the back of your brain.

How the Eye Gets an Image to the Brain

You now know the pathway light travels through the eye to create vision, but how does the brain transform this information about light into the images we see? Scientists know that different areas of the brain deal with different parts of vision like colour, depth, size and shape. In the visual cortex are special types of cells that respond to different features of objects. Some cells respond to vertical lines, some cells respond to horizontal lines, some to corners, some to different angles of orientation. These cells are called **feature detectors** and they respond only when light rays have signalled that the feature they detect is present. In this manner the feature detectors signal the brain what shapes a person is seeing. Millions of feature detectors work in unison to relay a complicated picture to the brain.



Pathways in the Human Visual System
Psychology & Life 13th Ed., p. 228 fig 7.10, Philip G. Zimbardo, ©1992, Allyn & Bacon Publishers. Reprinted by permission of Allyn & Bacon. Reproduction of this material is prohibited without written permission from the publisher.

How Colour is Seen

Scientists know that light travels in waves rather than in a straight beams. Light waves cycle up and down in an repeated pattern. The distance between the peak of one up cycle and the peak of another up cycle is defined as a wavelength. Wavelengths differ from each other in the distance between consecutive waves. Humans are only able to see light wavelengths from 360 nm (nanometers) to 760 nm (a nanometer is 10^{-7} centimetres) long. Each wavelength represents a different colour to our brains. Shorter wavelengths appear bluish, medium wavelengths appear greenish or yellowish, and long wavelengths appear reddish. Every colour the human brain can perceive is represented by these visible wavelengths. When we see a rainbow, for example, we are seeing light of different wavelengths that correspond to these colours. Like the feature detector cells, certain cones (one type of photoreceptor) respond to certain wavelengths, thus signalling to the brain that a certain colour is present. Cones can be sensitive to red, green or blue light. The actual colour we end up believing we are seeing depends on what combination of cones is being stimulated and the degree to which each one is being stimulated. (These three cone receptors can combine to make every colour imaginable).

It is interesting to note that many perceptual psychologists believe that everybody perceives colour differently. How your brain perceives the colour blue may be slightly different from how your friend perceives the same wavelength. People's perception of wavelengths are often similar, but rarely the exact same.

Some people, however, do not see colours or can only experience a limited range of colour. These people have colour blindness. Most people who experience colour blindness are male because the trait is genetic and is carried on the X chromosome (recall that women's sex is characterized by an XX chromosome pattern and men's sex is characterized by an XY chromosome pattern). In this regard, a colour blind woman would have had to have the trait passed down by both her parents to be, but a man would only require the trait to be passed down by his mother.

We identify four different kinds of colour blindness. Each has a scientific name: monochromatism, protanopia, deuteranopia and tritanopia. People with monochromatism can see only in shades of white, grey and black. This is because their cones do not function and they rely entirely on their rods for visual information (remember that rods are used in dim light or dark). Just as you can't distinguish colours in very dim light, neither can people with monochromatism distinguish colour. They also have very poor over all vision and are ultra sensitive to bright lights because their rods are trying to function in light they were not designed to function in. This form of colour blindness occurs in ten out of every million people.

People with protanopia perceive only shades of blue and yellow. The shades go from vibrant to watery with grey, but no other colours in between are recognized. One percent of males and 0.02 percent of females have protanopia. Deuteranopia is very similar, except that grey is seen where it shouldn't be seen, at 498 nm rather than 492 nm, as it is in protanopia. Deuteranopia affects the same number of men, but only 0.01 percent of females.

Tritanopia is extremely rare, affecting 0.002 percent of males and 0.001 percent of females. People with tritanopia experience shades of green at lower wavelengths, grey at 570 nm and red at higher wavelength. They see no other colours in between.

Of interest, as well, is that not all animals have colour vision. We know that dogs do not have colour vision and cats may have minimal colour vision, but birds, fish and some monkeys have excellent colour vision. This makes sense when you think of brightly coloured fish or birds. In these species colour is often used in attracting a mate. In many bird species, the male with the most beautiful plumage gets the best mate because bright colourful, well-groomed feathers signals good health and no disease. When considering survival of the species, a bird with colour blindness may not get the best mate, and therefore will pass on some undesirable traits to her offspring. So, in birds and fish, being able to see colour is important to their survival and the survival of their offspring.

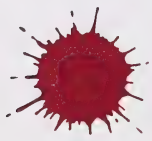
Colour Theory

How do you make green, pink or maroon? What is meant by terms like monochromatic, complementary or secondary? What is a cool colour? The study of colour theory can answer these questions.

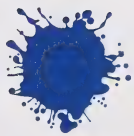
A good point to begin is with the primary colours; red, yellow and blue. We need these three colours in order to make other colours. For instance, in order to make green, equal parts of both yellow and blue are needed. When a new colour is made from the combination of two primary colours it is called a secondary colour. A diagram helps clarify this situation.

Primary Colours

Yellow

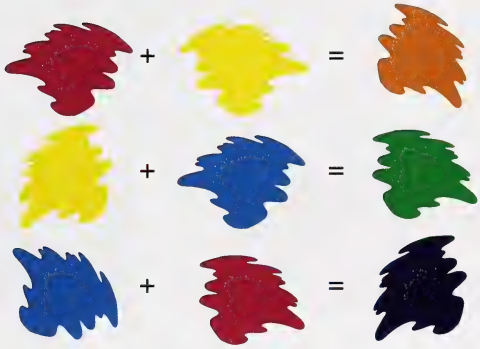


Red



Blue

The Making of Secondary Colours

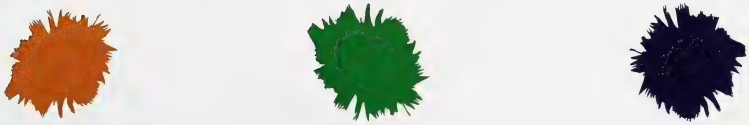


Red + Yellow = **Orange**

Yellow + Blue = **Green**

Blue + Red = **Purple**

Secondary Colours



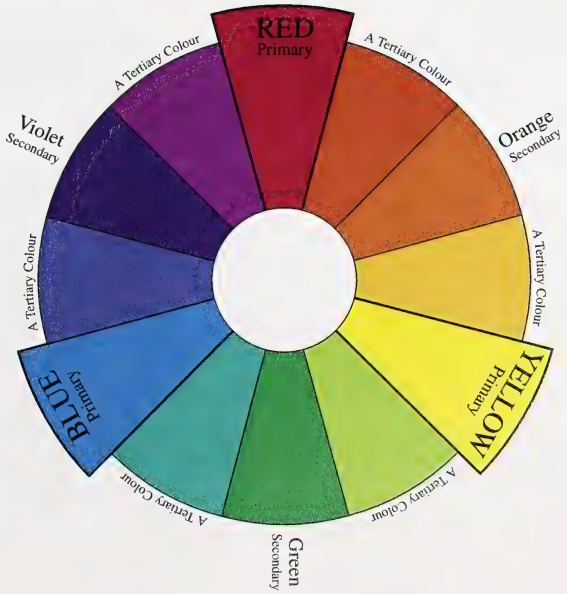
Orange Green Purple

Tertiary Colours

A tertiary colour is a combination of a primary colour plus a secondary colour. It is also called an intermediate colour.

What is meant by **complementary colours**? Colours opposite each other on the colour wheel are called complementary colours. **Red/ Green** and **Blue/Orange** and **Yellow/Purple** are called complementary colour combinations. These colour combinations placed near each other are exciting and when they are combined they produce duller but intense colours. They negate the use of black when a dull colour is needed (black + a colour = a shade but it is best to mix complementary colours instead as they will be more intense).

A Colour Wheel



Tint:

White + a colour

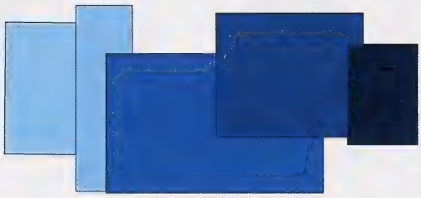
i.e. White + Red = **Pink**

Shade:

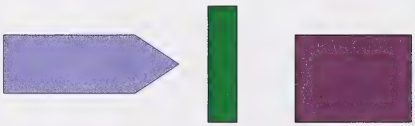
Black + a colour

i.e. Black + Red = **Maroon**

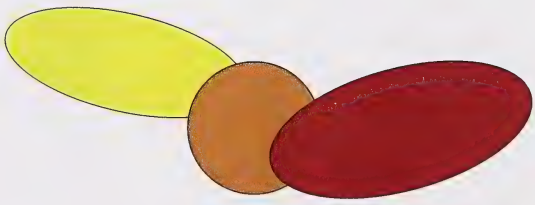
Monochromatic: A composition can be created by using one colour but in varying degrees. For instance, variations of blue from light to dark are illustrated below:



Cool Colours: Blue, Green and Purple are described as cool colours because they suggest soothing water, sky and grass and so tend to calm us.



Warm Colours: Yellow, Orange and Red remind us of the sun, sand and evoke activity.



Sir Issac Newton directed a beam of sunlight through a glass prism in 1666 and showed how it could split light into a variety of colours. These bands of colours were ordered just like the sequence in a rainbow. He called this range of colours a "spectrum". To prove that white light was indeed made up of these colours, he reversed the experiment by allowing the "rainbow" colours to pass through a second prism, whereby the rainbow of colours resorted back to the sunbeam. In nature, water droplets act as a prism and split light, which results in a rainbow.

A beam of light split by a prism

Colour can be affected by weather, lighting situations, and is influenced by surrounding colour. You can try this experiment using a Red/Green complementary combination:

* Cut two rectangles from paper/card.
* Paint one rectangle pure intense green.
* Paint the other rectangle the same green into which you have mixed some red paint. (Complementary colours mixed together dull the intensity of the other)
* Add the same red circle in the middle of each of the green rectangular shapes.

Ask yourself, which red circle appears to be the brightest?

Colour has different psychological overtones and can be therapeutic. Why did you choose to dress in the colours you did today? Have you ever changed an article of clothing at the last minute because the colour just didn't "feel" right? When you feel sad do you wear a cool or a warm colour? In order to make a small, red hallway seem larger and less claustrophobic, try painting it a light, cool colour because that would tend to visually increase its size. What psychological effects might be expected from the colour violet? This cool, peaceful colour, is often associated with lilac and lavender fragrances and so involves another sense, smell.

Colours are associated with a variety of emotions in different cultures. For example, red is a warm, positive colour whereas green, a cool colour is used to reduce anxiety. In some cultures brides wear red as a celebration of joy but white is seen as a sign of mourning. Colour suggests emotion in our writing. We know exactly what "paint the town red", or "purple with rage" means. Previous experiences and memories, both positive and negative, all influence our reaction to colour.

Visual Deprivation Effects

critical periods – a time in development when certain skills must be acquired or they will never appear

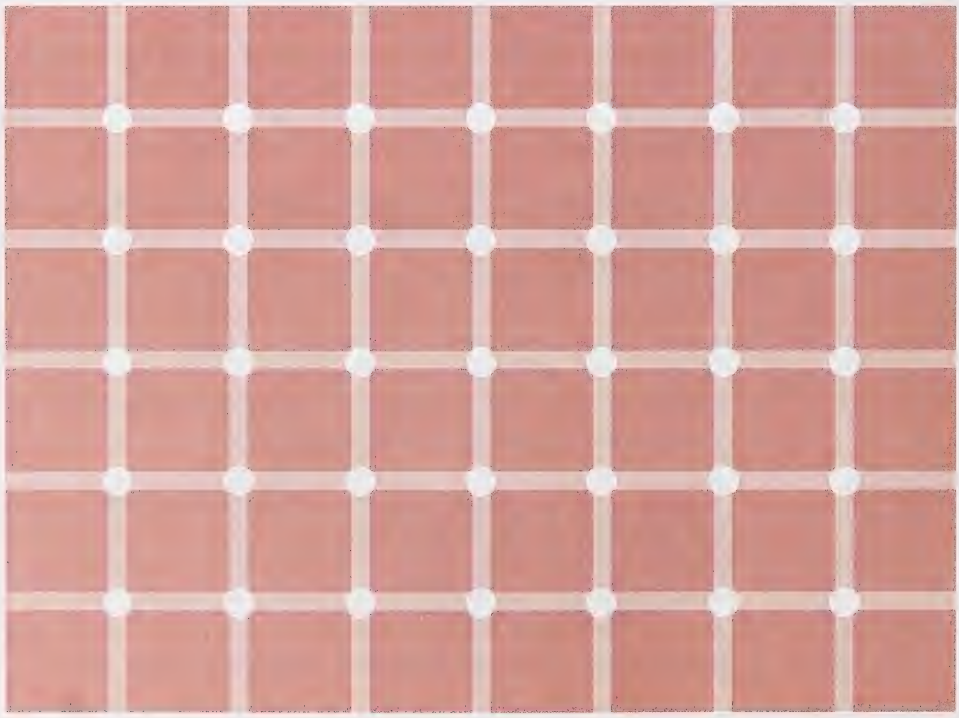
feature detectors – cells in the visual system that only respond to certain visual features

As you learned earlier in the course, vision can be affected if a person has no experience with certain stimulation at **critical periods** of development. This phenomenon was detailed to you in the Hirsch and Spinelli (1971) experiments in which baby kittens wore eye shades that showed them only horizontal or vertical lines. When the eye shades were removed the kittens were unable to see any other lines than the ones they were exposed to through their eye shades, because their feature detectors for different features never developed. By the time the kittens were exposed to different stimuli, the **feature detectors** had become useless.

Visual Illusions

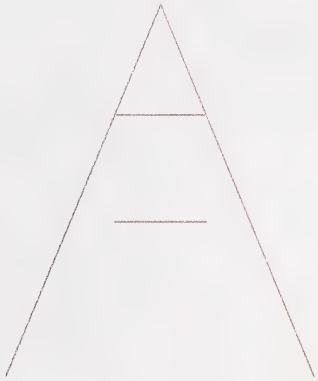
Often our eyes deceive us. Sometimes things look bigger than they are or smaller than they are. At other times objects appear to be moving when they are perfectly still. Following are some common visual illusions that occur to everyone. They occur when the brain confuses the information sent to it and makes us perceive that we are seeing something we are not.

How many dots can you see?

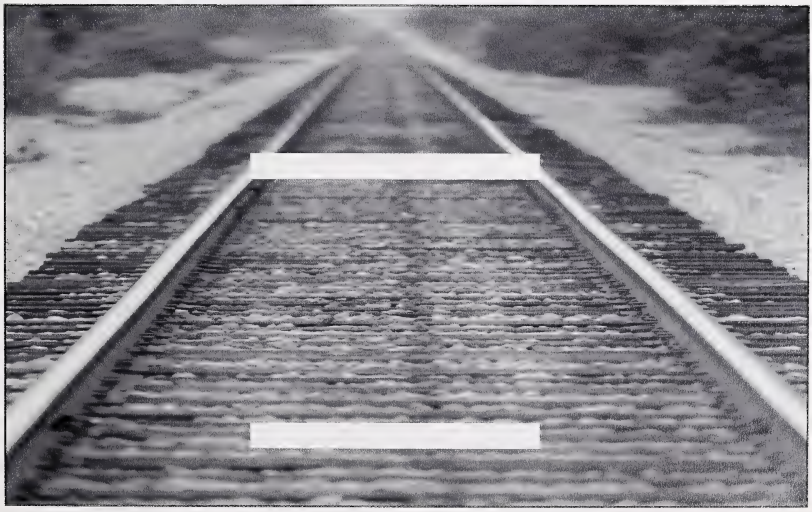


The Ponzo Illusion

Briefly look at the following diagram and decide which line looks longer.



Briefly looking at the picture. Most people say that the top line appears longer than the bottom line although both lines are exactly the same length. This visual illusion concerns depth-perception. The Ponzo illusion works because people perceive the lines coming together as meaning that the top of the picture is further away than the bottom part (even though the top and the bottom of the picture are the same distance apart from you). And if the top line is farther from you, it must be longer than the other one, even though they appear similar in size. As in the picture of the train tracks, you believe that the top of the picture is further away than the bottom because this is what your brain knows about the way train tracks work, and how they are drawn; they carry off into the distance. In this case, because of your prior experience, your brain has tricked you into seeing the top line as being longer than the bottom line.



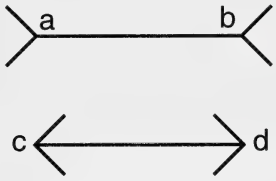
The Young Beauty Illusion

Look at the picture below. What do you see?

Do you see a girl with her head turned away? Now, look again, but this time look for an old hag. Do you see her? This is another situation where our brain fools us into seeing things a certain way. Because you read that this illusion was called the 'young beauty' illusion, you expected to see a young beauty and your brain sought one out. If you were originally told this was the 'old hag' illusion, you would have seen the old hag first. Try this with one of your friends. Just show the picture, calling it the 'old hag' illusion. What did your friend see?

Other Classic Illusions

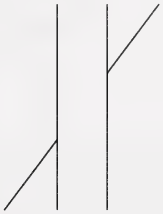
Example 1



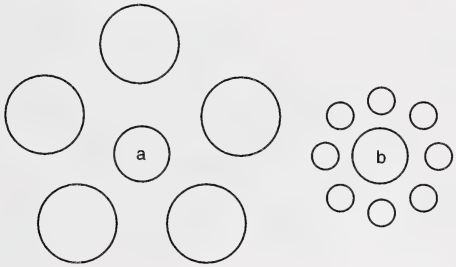
Which horizontal line appears longer? They are both the same but the top line appears longer because it appears to be stretching out rather than closing in.

Example 2

Is the line unbroken? No, but it appears to be because our brain sees a separation and doesn't expect the line to be continuous underneath the separation.

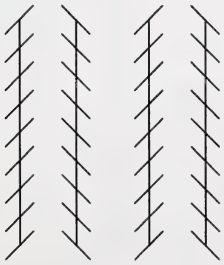


Example 3



Which central circle is bigger? Both are the same but the circles around them make the one on the right look bigger by contrast.

Example 4



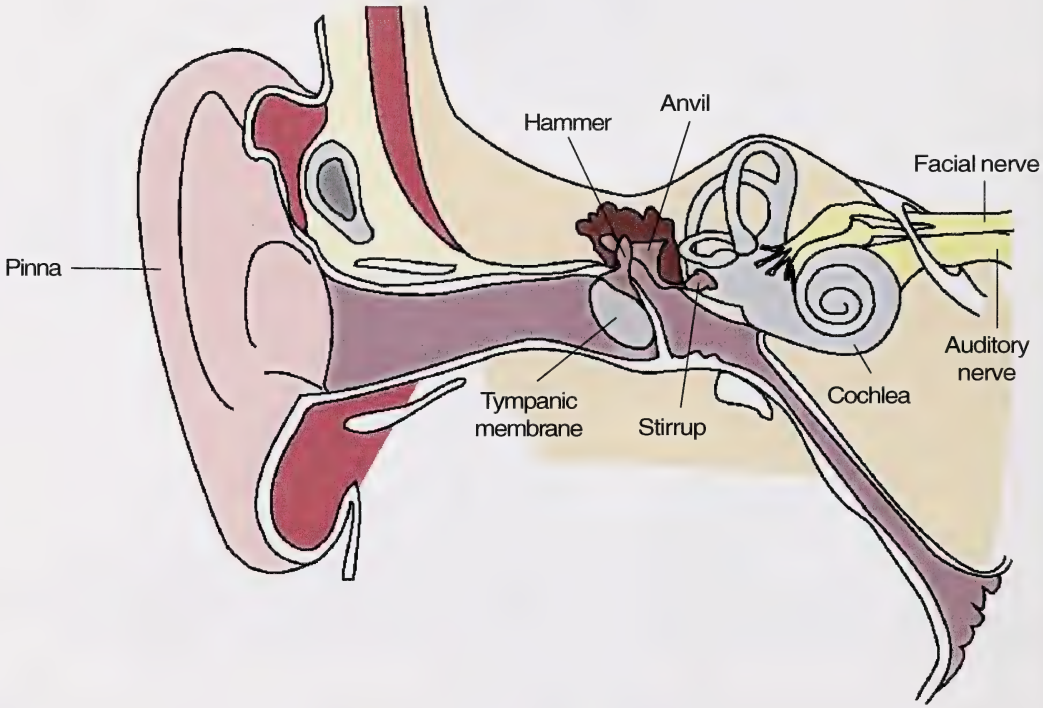
Are the lines parallel? Yes but the intersecting lines make the vertical lines look smaller at the bottom.

What do all these illusions have in common? They all show that perception is not simply a process of your brain recording information from the environment. It actually processes and relates the image based on what it believes to be true and its previous experiences — sometimes fooling itself into believing something that isn't true.

The Auditory System

Audition (hearing) is also very important in giving us information about our environment. Because audition is extremely important in spoken communication, many people living with hearing loss tend to feel more isolated when relating to people with hearing. People who slowly lose their hearing often suffer from feelings of rejection and depression, and commonly, anger — and often they don't realize that these feelings are due to a loss of hearing because they, themselves, are not always aware anything is wrong with their hearing.

Anatomy of the Ear



pinna – the outer shell of the ear, visible on the head

The external parts of our ears are especially designed to optimize hearing. Sound waves travel and are reflected off our pinna (part of the ear visible on our head) and into the external canal. From there the sound waves travel into our ear where they come in contact with the **tympanic membrane** (eardrum). The tympanic membrane is a thin membrane that blocks the external world from the delicate bones of the inner ear. The vibrations created by the sound wave make the tympanic membrane vibrate.

tympanic membrane – a thin membrane that blocks the external world form the delicate bones of the inner ear (also called the eardrum)

hammer – one of the three tiny bones of the inner ear

anvil – one of the three tiny bones of the inner ear

stirrup – one of the three tiny bones of the inner ear

frequency – measures the amount of cycles a wave (light or sound) travels in a given time

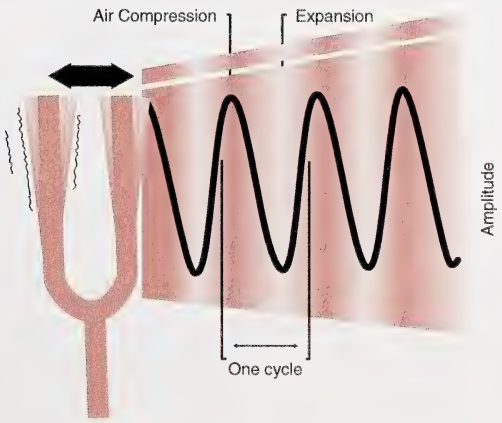
The vibrations of the **tympanic membrane** then set the smallest bones in the human body (the hammer, the anvil and the stirrup) vibrating in response to the tympanic membrane. The bones form a chain, relaying the vibrations from **hammer** to **anvil** to **stirrup**. The stirrup then transfers the vibrations to the primary organ for hearing, the cochlea. The cochlea is a curled up tube that is filled with fluid. Down the centre length of the cochlea is a thin membrane called the basilar membrane. The fluid in the cochlea starts to form waves as the vibrations are relayed to it. The waves travel down the length of the cochlea, go around the ending tip and return the same way they came. The movement of the wave causes the cochlea to move. It starts tiny hairs on its surface vibrating. These tiny hairs are in contact with the auditory nerve, and the vibration of the tiny hairs turn into nerve impulses which travel to the brain via the auditory nerve.

How the Ear Gets a Sound to the Brain

Like light waves, sound waves also travel through the air in a wavelike motion. Sounds create vibrations and these vibrations are then carried into the air (touch a speaker when the stereo is turned on and you can feel the speaker vibrating). These vibrations push air molecules back and forth, creating the sound waves that then travel away from their source.

Sound waves have two different features: frequency and amplitude. **Frequency** measures the number of wave cycles in a given time. One cycle is the distance from the top of one wave to the top of the next. Frequency is usually measured in Hertz (Hz) which term means cycles per second. So, a sound with a frequency of 1500 Hz, has 1500 wave cycles per second. The higher the frequency, the higher the pitch will be in the sound we hear. A sharp squeal, for example, will have a higher frequency than the sound of a person mumbling.

Sound Waves



amplitude – *measured by the distance between the top height of the wave and the very bottom of the wave (sound or light)*

auditory cortex – *the part of the brain that receives and translates auditory information*

Amplitude measures the sound wave's strength and, therefore, apparent loudness. Amplitude is measured by the distance between the top height of the wave and the very bottom of the wave. The bigger the distance between the top and the bottom, the louder the noise will sound.

In summary: Sound waves are created by vibrations that travel to and through your ear where they are then translated into neural signals and sent to areas of the brain that specialize in sound, the **auditory cortex**. The brain then converts these impulses into the sound as you hear it. People who have hearing loss, often have a physical defect that does not allow the process of sound translation to occur. Hearing loss may be caused by faulty neural connections in the brain or deformities in the structure of the inner ear. Either way, with the use of such devices as cochlear implants (man-made units that can function as a cochlea), hearing aids and sign language, people with hearing loss can function quite well.

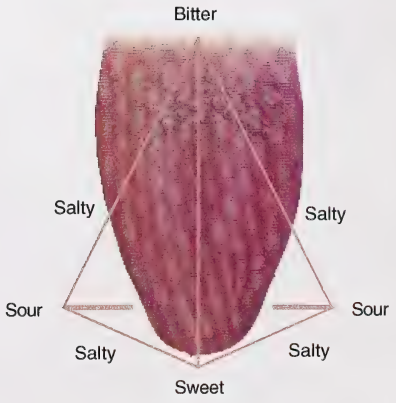
Taste and Smell

The Theory Behind the Chemical Senses

Humans have two senses that respond to the chemical properties of substances: taste (gustation) and smell (olfaction). What we taste and what we smell are related to the receptors on our tongues (taste buds) and in our noses. These receptors react with the different chemicals in the food we eat or in the air that we inhale.

Anatomy of the Tongue

The tongue is designed to experience four distinct tastes (bitter, sweet, sour, salt). These tastes all combine to cover the range of human taste experiences. Different spaces on the surface of our tongues have receptors that are specialized in tasting only one of the four flavours. The distinct taste receptors seem to be concentrated on the outer edges of the tongue. Towards the centre of the tongue, the receptors start to intermix more and we have receptors that best taste salty substances next to receptors that best taste sweet substances, and so on. All taste receptors can taste all four substances, but only in very small degrees; they mainly specialize in responding strongly to one taste.



How we Taste

The receptors on our tongues start to fire electrical impulses when they come in contact with the various chemicals in food. These impulses are relayed to the brain and the number of receptors firing in combination with how fast they are firing determines what taste the brain will tell us we are experiencing.

How we Smell

A lot less is known about smell than is known about the other four senses. Physiologists believe that the receptors for smell are embedded deep within the nasal passages. As with the tongue, certain receptors probably are designed to interact with the chemicals in certain odours and these receptors send electrical impulses up to the brain where it translates what is being smelled.

One interesting thing to note is that smell and taste are certainly linked somehow. People are unable to taste well if their nasal passages are blocked. You might have experienced this phenomenon if you tried to eat when your nose was stuffed up. You can actually experience this phenomenon by holding your nose plugged while you eat. Without using your nose, you will be able to taste very little, if anything at all. Why this occurs is unclear, but many case studies have been recorded about people who, because of brain injury, have lost their sense of smell and along with it their sense of taste.

Pheromone Studies

pheromones – undetectable chemical scents that are released by the bodies of humans and animals

Scientists have some evidence that humans may be able to respond physically to chemical scents that are virtually undetectable. These chemical scents are called pheromones. In the animal kingdom, pheromones are used to communicate danger, sexual receptivity and even places where food has been found. Much study has been done on how animals use pheromones, but scientists also think that pheromones play a role in human life, as well. Pheromones seem to be responsible for regulating menstrual cycles, increasing sexual behaviour and increasing sexual attraction. Studies have shown that women who live together long enough will experience their menstrual cycles at the same times. Likely, this condition occurs because of the non-detectable chemical scents that women give off that unconsciously inform others of their state of fertility. These pheromones appear to affect other women with whom they spend considerable amounts of time and their cycles will start to synchronize.

It is also thought that men release pheromones in their sweat that affects the sexual and reproductive well being of females. In one study, women were given, on their upper lips, weekly swabs either containing the pheromone from male sweat or not containing it. The women who received the pheromone experienced more regular menstrual cycles and fewer fertility problems.

The Cutaneous Sense

The cutaneous sense is our sense of touch. It involves sensing pleasure and pain and heat and cold.

Different Skin Receptors and their Connection to the Brain

Human skin is covered in different types of skin receptors. Some areas of the body, like the lips and finger tips, are packed with receptors whereas other parts, like the back, have fewer receptors. Areas packed with receptors are most likely to sense stimuli, whereas areas with fewer receptors are less subject to environmental changes and pain.

Different shaped receptors sense hot, cold, pain and pleasure. These receptors are specialized to respond to certain stimuli. For example, your heat receptors will fire as you bring your finger near a candle flame. If you actually put your finger in a candle flame your pain receptors will start to fire, signalling to your brain that you must withdraw your finger or risk a burn.

Pain Management

Pain has a large psychological component; in other words, much of the pain we may feel may not be physical, but rather mental. This attests to the fact that many people can overcome pain by using their minds, using relaxation techniques or even through hypnosis.

placebo – a pill, treatment, potion that does not affect the body in any way, although the person taking it believes it will have a medical effect

Many studies have found that the brain can actually be fooled into believing it feels better. In research studies, people complaining of intense chronic pain are given a placebo (a pill that does not affect the body in any way) and typical results will show that approximately 30 percent of them will state that their pain was reduced after taking the pill. Merely by believing they were taking medication to reduce their pain, they were able to reduce their pain levels. This result is known as the **placebo effect**. The effect of placebos has been proven over and over again.

The response to pain also has many culture differences. In cultures where it is more acceptable to show pain in front of others, people who are part of that culture will exaggerate the amount of pain they are feeling and will scream, wail and moan in front of others when given a painful stimulus. People from cultures which don't approve of sharing their pain with others will flinch when given the same painful stimulus but will stifle any crying or moaning until they are alone. They will also discount the intensity of the pain. Apparently, how a person is brought up to regard pain will affect the response to it. This concept coincides with experiments in which people will report higher levels of pain if they expect sympathy as a result. Those who don't expect sympathy will report lower levels of pain.

Phantom Limbs

The phenomenon of phantom limbs has baffled both sufferers and doctors, for years. Phantom pain occurs when someone who has had a limb amputated feels pain in the missing body par. A man who has had his right leg amputated may complain that his right foot hurts or that his right leg is itchy, even though he no longer has a right foot or right leg. This phenomenon may occur for either of two reasons. First, it may be purely psychological in that people could believe they feel pain with no physical cause at all. Or, perhaps, although the leg is gone, the neurons and areas of the brain responsible for monitoring it are still intact and might occasionally fire off impulses making a person believe the missing limb is hurting.

Attention in Relation to Perception

Much of what we perceive and sense depends on our levels of attention. For example, when we go to a play or a ballet or a concert, so much is going on that we can't take it all in. We can't focus our attention on both the lead singer and the drummer sitting on the other side of the stage. We must focus our attention on one or the other and by doing so we, reasonably, miss something else that happens. Attention can be defined as our ability to go into a state of focused awareness, thereby readying our bodies to respond to what we are focusing on.

attention – our ability to go into a state of focused awareness, thereby readying our bodies to respond to what we are focusing on

What grabs our attention is based on many factors. We can focus our attention by concentrating. If we are in a movie theatre and are looking for our best friend, we can quickly glance over hundreds of unfamiliar faces until we spot our friend. We don't have to focus on every face we glance at because we are focused on spotting the certain features that make our friend unique. Unexpected things also easily grab our attention. The sound of a siren will immediately focus our attention because it is a sound we don't always hear. Intense stimuli will also focus our attention. A loud bang or the sight of an explosion will certainly make us respond.

Attention as a Limited Resource

As stated above, we cannot pay attention to everything in our environment. We must select what we want to attend to and decide how much attention we want to pay to any particular factor. A person may be able to read a book and watch TV at the same time, but can't do both well. In order to understand the words in the book, the person must focus on them, and at the same time miss some of what is happening on TV.

Many people believe they can do two things at once and do them well, but that is not how attention works. Although you may believe you can study and watch a hockey game at the same time, you won't do the two tasks as well as if you were focusing on only one. It takes incredible practice and control to do two very different things well at the same time. Try this: sing one of your favourite songs while mentally performing your 12 times tables. Difficult, isn't it? If you manage both tasks, you got through them less accurately and more slowly than you would have if you were focusing on one task at a time.

Dichotic Listening Experiments

Dichotic listening experiments have been designed to show how we must selectively focus our attention if we are to take in information accurately. In these experiments, subjects wear headphones through which one story is piped into one earphone and another story is piped into the other. The subject is then told to pay attention to one story or the other and discuss it when the experiment is over. Although the brain is receiving both stories, some subjects report that they know what was being said only in the ear they were listening to. Some report that they have absolutely no idea about what was being said in their other ear. These experiments tell us that our attention is so advanced that we can consciously select what we will pay attention to, and block out anything else that interferes.

Automaticity

Sometimes we process information without consciously doing so. Whether or not we process this information depends on the difficulty of the task we are doing. In dichotic listening experiments, attention must be rigidly focused to filter out other information and pay attention to the task at hand. But with other tasks that don't require such intense concentration, the brain may pick up information without the subject even being aware of it; this is called automaticity. Try the following experiment: read through the list of words below until you find the word blue.

cat	gravy	violet	pink	kangaroo
red	sandwich	hamburger	fries	carnation
spaghetti	gold	silver	mouse	orange
bird	pizza	cow	snake	wolf
duck	hamster	dog	blue	steak
marigold	green	yellow	milkshake	salad
rose	fish	daisy	tulip	purple

Can you recall any of the other words? Most likely you can and you did it without focusing your attention. You did it automatically. Can you state what four major categories the words could have been put in? Most likely you have some idea of this as well (colours, flowers, animals and foods). Apparently, our brains have filters that can actively block information out at certain times while unconsciously letting information in at other times.

Sensory Deprivation

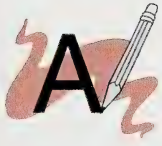
sensory overload – when a person receives too much information coming into his/her senses

sensory deprivation – occurs when a person is not allowed to use his/her senses

From the dichotic listening experiments, you have learned that a person receiving too much information must selectively attend to only one stimulus at a time while trying to block out the others. When faced with this kind of sensory overload a person has to actively choose what to focus attention on and what to try to ignore. But what happens when a person is deprived of sensory experiences? What happens when they can't hear, see, or touch?

In the 1950s sensory deprivation studies were quite popular. During these studies, researchers would put goggles on test subjects to limit their eyesight; have them wear thick gloves to limit their sense of touch; let them hear only "white noise" (a continuous hum that never changes); and have them lie still for a day or more at a time. The results were quite interesting. Subjects soon became bored, restless and cranky. When they were given problem-solving tests, they did poorly. The longer they were sensory deprived, the worse they did on the tests. Some test subjects reported seeing and/or hearing hallucinations. Most research subjects dropped out of the experiment after two to three days, despite the fact that they were being paid well for their time.

When the test subjects were allowed exposure to sensations again, their perceptions were distorted. They had problems seeing and hearing clearly. During the study their brainwave patterns slowed down; after the experiment was over, it took several hours before their brainwave patterns returned to normal.



Turn to Assignment Booklet 7 and complete the assignments for Section 4, Lesson 1.

Glossary

Glossary

abnormal behaviour – a behaviour is considered abnormal based on three things: if the individual experiencing the behaviour is distressed by it; whether or not the behaviour affects the individual's life or functioning in a negative way; and whether or not the behaviour is deemed culturally acceptable

Apgar Exam – a method of assessing a newborn's overall health in five different categories: heart rate; breathing; skin tone; muscle tone and response to painful stimuli (the pain is momentary and relatively mild)

amplitude – measured by the distance between the top height of the wave and the very bottom of the wave (sound or light)

anvil – one of the three tiny bones of the inner ear

attention – our ability to go into a state of focused awareness, thereby readying our bodies to respond to what we are focusing on

autonomic nervous system – the nervous system that controls the life-sustaining processes (breathing, sleeping, beating of the heart) not under our conscious control

blind spot – the spot in a person's general area of vision, where there is no sight

Brazelton scale – assesses babies in four categories: attention and social responsiveness; muscle tone and physical movement; control of alertness; and physiological response to stress

clinical psychologists – psychologists who work with clients in an attempt to help the clients deal with their problems

Cognitive language theory – a theory that states children learn language by grouping new words into categories that reflect what they know about the world

cohort effect – a comparison of different generations when they are the same age. For example, a comparison of the average height of six year olds today compared to the average height of six year olds 50 years ago

cones – photoreceptors that are concentrated mainly in the centre of the retina. They deal with colours.

control group – identical to a test group but no independent variable is given

cornea – the transparent covering at the front of the eye

corpus callosum – a thick bundle of specialized neurons that allow each hemisphere of the brain to communicate with the other

correlational research – discovers relationships that exist between two variables

covert behaviours – behaviours that are undetectable by the human observer

critical periods – a time in development when certain skills must be acquired or they will never appear

cross-sectional studies – used to test subjects from different age groups simultaneously

crystallized intelligence – the type of knowledge a person learns in school

dependent variable – the change in behaviour that arises in an experiment because of the independent variable

descriptive research – involves simply monitoring behaviour and recording observations

display rules – developing socially acceptable emotional responses regarding how one should act in certain situations

dream analysis – *a technique used in clinical psychology. The client tells the therapist his/her dreams and then therapist helps the client translate their meaning*

empirical evidence – *the data (reports from observations) that is carefully obtained during an experiment*

feature detectors – *cells in the visual system that only respond to certain visual features*

feedback – *the information a person is given regarding his/her behaviour*

fluid intelligence – *the type of intelligence a person is born with. In other words, the kind of intelligence not learned in school—a person's "street smarts"*

Flynn Effect – *the phenomenon where a person's IQ score increases as they age*

free association – *a therapeutic technique used in clinical psychology. During free association the client will mention anything that comes to his/her mind*

frequency – *measures the amount of cycles a wave (light or sound) travels in a given time*

hammer – *one of the three tiny bones of the inner ear*

hemispheres – *pertaining to the right and left side of the brain*

heuristics – *general rules people follow in social situations*

historical studies – *used to study the differences between different generations*

hormones – *chemical substances released by glands that can affect body development and behaviour*

hypnosis – *an alternate state of awareness inducted by a trained hypnotist*

hypothesis – *a prediction made by a scientist about to conduct an experiment. It clearly states what the scientist believes will be the outcome of his/her experiment*

imprinting – *the phenomenon of baby birds following the first thing they see moving*

independent variable – *the variable in the experiment that when introduced is supposed to cause a change in the behaviour of the test subjects*

instincts – *unlearned behaviour patterns that appear in the same form at a certain point in the development of every member of a species*

iris – *the coloured part of your eye that controls the size of your pupil by making it smaller when the light is bright and larger when the light is dim. The iris adjusts to the amount of light so a person can get the clearest picture available*

labelling – *when a person is stereotyped by one feature alone*

language acquisition device (LAD) – *the genetic structure humans are born with that helps them acquire language*

learning theory of language development – *a theory that suggests children learn language through a series of rewards and by watching others*

lens – *located right behind the iris, the lens is responsible for focusing the images we see*

locomotion – *a person's ability to move around the environment whether by crawling, walking, dragging, hopping, etc.*

longitudinal studies – *used to study the same people at different ages*

naming explosion – *a child learning to speak's ability to acquire new words at an incredible rate*

neurons – *specialized nerve cells, in the nervous system, that are designed to communicate with other cells very quickly*

neurotransmitters – *the chemicals released by neurons*

normative studies – *designed to determine averages or norms*

operant conditioning – *a technique of using reinforcement to strengthen a person or animal's desire to perform certain behaviours*

optic nerve – *all the tails of the ganglion cells are bundled to make the optic nerve*

overextensions – *when a child discovers the name of an object and believes all similar objects are called the same thing*

overt behaviour – *a behaviour that can be observed in the form of a physical response*

parasympathetic division – *the part of the autonomic nervous system that regulates normal body functioning*

perception – *how we experience the world around us. Perception always refers to objects external to ourselves*

pheromones – *undetectable chemical scents that are released by the bodies of humans and animals*

phobia – *an intense fear*

photoreceptors – *specialized cells responsible for changing light signals into neural signals that can be read by the brain. They are found in the retina*

pinna – *the outer shell of the ear, visible on the head*

placebo – *a pill, treatment, potion that does not affect the body in any way, although the person taking it believes it will have a medical effect*

Prechtl test – *measures some of the same factors as the Apgar, but it also assesses a baby's facial expressions, alertness, reflexes, muscle tone, spontaneous movement and reaction to being placed in various positions*

prehension – *a person's ability to use objects with his/her hands*

prototype – *a general model that represents a category*

psychiatrists – *medical doctors who treat clients with abnormal behaviours*

psycholinguistic theory of language development – *belief that humans are born with a genetic structure that helps them acquire language*

psychology – *the scientific and philosophical study of an organism's behaviour*

pupil – *the dark centre of your eye, surrounded by the coloured part*

reaction time – *the time between a stimulus and its effect*

reflex – *an automatic response to a specific stimulus*

releaser – *anything that triggers an instinct*

reliability – *how well an experiments results transfer to different settings, situations and environments*

retina – *a complex layer of cells along the back wall of the eye*

rods – *photoreceptors located around the edge of the retina. They are responsible for dealing with dim light.*

schemas – *are sets of descriptors we use to classify and categorize an object, place, event, animal, person, etc.. For example, our schema for a car may be: wheels, metal frame, drives, steering wheel*

scientific method – *a set of attitudes and procedures for gathering and interpreting scientific data*

scripts – *a sequence of behaviours one must perform when in a certain situation*

self-fulfilling prophecy – *when someone believes a stereotype about him/herself and behaves in a manner to fulfill that stereotype*

sensation – *how we experience the world around us. Sensation refers to our internal experiences with objects*

sensory deprivation – occurs when a person is not allowed to use his/her senses

sensory overload – when a person receives too much information coming into his/her senses

sequential design – combines the best features of a longitudinal study and a cross-sectional study

sleep debt – when people do not get enough sleep they build up a sleep debt that must be paid off in rest for the body to function fully

social inference – the guesses people make when they are unsure of how to act in a certain social situation

social referencing – when a person looks at the behaviours of others for guidance when he/she is unsure of how to act in a certain situation

species-specific behaviours – are very much like instincts. They are unlearned behaviours that surface in certain species but are less linked to reproduction and survival

stereotypes – schemas that narrowly and negatively attempt to define a group of people

stirrup – one of the three tiny bones of the inner ear

survival of the fittest – the notion that all organisms go through evolutionary changes, and those with the characteristics best suited to their environment survive to pass their genes on to their children

sympathetic division – the part of the autonomic nervous system that deals with responding to emergency or crisis situations

synapses – the small gaps between neurons where neurotransmitters are released

temperament – a measure of a person's responsiveness and emotional expression in social situations

teratogens – anything that may harm a fetus when exposed to the mother

trait – a mental structure that initiates and guides reactions, accounting for the consistency in one's behaviours

twin studies – used to determine the effects the environment has on behaviour. Identical twins who were separated at birth (usually through adoption) are later tested for behavioural differences

tympanic membrane – a thin membrane that blocks the external world from the delicate bones of the inner ear (also called the eardrum)

underextensions – occurs when a child learning to speak does not recognize an object as belonging to a certain category

validity – how well an experiment actually tests what it is supposed to

vivisection – dissection or other painful treatment of living animals for purposes of scientific research

zone of proximal development – the difference between what a child can do on his/her own and what they can do with teaching and instruction